The International Journal of
Orthodontia, Oral Surgery and Radiography

(All rights reserved)

VOL. XVII ST. LOUIS, JUNE, 1931 No. 6

ORIGINAL ARTICLES

PRESIDENT'S ADDRESS*

BY HARRY E. KELSEY, D.D.S., F.A.C.D., BALTIMORE, MD.

I HAVE few, if any, recommendations to offer with regard to which the Society would have to take a definite action. My main reason for this is that for some time past there have been recommendations offered which involve rather drastic changes in the conduct of the Society, or at least require serious consideration and careful action. It may be said that we are still working out a number of these recommendations and I believe that for the ensuing year, at least, we should do well to mature what plans have been undertaken, rather than to take up new problems.

There are certain questions affecting our profession, however, which demand some consideration, and to which we should all be giving our best thought and attention. At least one of these matters has been presented to me by letters received during the year from two or three members, and there are others which are forcing themselves upon the dental profession and its specialties, that we in common with the rest of the profession and even the laity must recognize and endeavor to settle in a way that will be a mutual benefit to the profession and to the laity.

I have in mind in this connection principally a question which crops up in an informal way at almost every meeting where professional men congregate. It is the question of supply and demand in the field of dentistry. It involves those trite and well-worn terms, panel and state dentistry. I do not mean to go into a lengthy discussion of this question, but should like to call attention to some phases of the matter which seem to me pregnant with significance to us as a profession.

Twenty years ago dental graduates did not find it very easy to build a lucrative practice in a reasonable length of time. About that time, Doctor

*Read at the thirtieth annual meeting of the American Society of Orthodontists, St. Louis, Mo., April 21-24, 1931.

Ebersole started the oral hygiene movement, at least he figured prominently in it, although its inception was probably due to the cooperation of a number of outstanding men. He practically wore himself out and died long before his time in his efforts to educate the profession and laity as to their mutual duties and needs, but the movement once started acquired impetus, and with the inception of the dental hygienist régime, it swept over the country, so that in a few years the laity became conscious of the need of dental service and the demand was greatly increased.

I have been astonished to see each succeeding class of dental graduates step out into practice, most of those at all efficient being able almost at once to make a comfortable income and rapidly enlarging it to a very satisfactory one, investing at the same time in equipment many times more expensive than that which was thought adequate only a few years before.

The education of the public has gone on, the demand for dentistry has increased, but the supply of dentists is decreasing and of course the number of specialists must be correspondingly decreased. This brings us to the problem which, if not met in a rational, sane way by the dental profession, will be taken out of our hands by those who have been taught that dental service is important. It has long been known by the medical and dental professions that sound health is requisite for good citizenship, and fifty or seventy-five years ago many sections of the country believed, and today all of it believes, that a reasonable intellectual education is necessary for good citizenship, and out of this grew compulsory education. Certainly health is as important to good citizenship as education and much more important to the individual himself, and when this idea has been fully absorbed by the public, they are going to take some action and devise means, good or bad, whereby every individual not only will find it possible to secure the various kinds of treatment and advice which will enable him to remain in good health, but will even be compelled to secure or submit to health examinations and treatment, if he does not do so voluntarily. This would be state dentistry, and if the state can spend billions on education, it will be expected in time to do the same on health. The welfare of the individual depends more upon his physical health than upon his intellectual attainments, at least, the physical must precede the mental in order that the mental may attain its highest development. My own personal belief is that eventually, in some way, there will be adequate medical and dental care supplied for every one, and in addition there will be perhaps the more highly trained medical and dental men who will still engage in private practice and will bear the same relation to the large state medical and dental corps that the private schools do to the public schools of today. In other words, conditions should be as favorable, or more so, for the ambitious man to rise to distinction in his profession as they are today, and special skill and ability acquired through hard work and application will have the same opportunity for the highest rewards in the way of distinctive standing, as well as in a merely financial way.

A few months ago an orthodontist said to me that we should wake up the public to the need of orthodontic treatment. My reply was that our real problem was to provide it in case the public did wake up more fully than

they already had. As a matter of fact, the public today is conscious of the need of orthodontic treatment, but the vast majority cannot afford it, and it can never be furnished to them adequately, unless provided by the state or by large endowments.

Of course every orthodontist does what he can individually, as does every other professional man, but at best this is but a drop in the bucket; therefore, I repeat, it is up to us as one of the professions to lend our best efforts to the solution of this problem, which will be forced upon us whether we wish it or not. The solution I have suggested as being a probable one does not seem to be one which would curtail ambition, but would rather inspire the best minds to go in for a professional career, where, as in every other line of endeavor, there are rewards at the top.

The research worker as well as the practitioner with the highest skill, would find, as he does today, an unlimited opportunity for development. I am making no plea for low-grade professional service for the masses. If a better solution can be evolved I will welcome it. Possibly there is a better one.

Let us turn now to our own research problem. We have, as you are all aware, been supporting a research conducted by Dr. John Marshall at the University of California. I feel that the papers which Dr. Marshall has presented to us at different sessions since he has been engaged in this research, justify it most thoroughly, and I am in favor of carrying out our five year program, which it is to be hoped will give ample time to get results from which to draw conclusions. Personally I have not been so much interested in whether this research would show that roots sometimes absorb as a result of orthodontic treatment, because it seems to me that there are brought to my attention as many cases of absorption of healthy roots where no orthodontic treatment has been given, as where it has. In other words, the result will be just as important and interesting whichever way the question is decided. It is the truth we want. In addition to that phase of the investigation, it has been my hope that this research might settle for all time just what happens in the supporting structures during tooth movement, thus enabling us to understand better the limitations which apparently surround some of our stubborn cases.

Another research to which we are not contributing directly but nevertheless indirectly, as members of the American Dental Association, is the one undertaken at the Bureau of Standards by the Research Commission of the American Dental Association, through its associates, working conjointly with the experts at the Bureau.

So much success seemed to attend the efforts of Dr. Taylor and Dr. Paffenbarger for the American Dental Association, and Dr. Souder and Dr. Sweeney and others for the Bureau of Standards, in connection with the development of a more satisfactory gold inlay technic, involving of course every material which is used in the final production of the inlay, including of course the gold itself, that I felt that a similar investigation of orthodontic golds would be helpful and might be the means of discovering how to produce spring gold alloys having the desirable qualities developed to a higher degree than it has yet been possible to bring them, and the Bureau

Committee was glad to inaugurate this investigation as being something in the nature of a response to the request of the American Society of Orthodontists to the Research Commission, for funds with which to undertake some research especially relating to orthodontic materials. Of course we all recognize the excellent spring golds which have been developed by the manufacturers, and many of them possess a very high efficiency, but there are none as yet that have been completely satisfactory. When one quality is especially pronounced, a corresponding weakness seems to develop, as for instance, when the spring is of high quality, brittleness and the tendency to crystallize seem to accompany it. Of course an ideal wire is one in which springiness is developed to a high degree, and at the same time great toughness and no tendency to crystallize and crack up at fatigue points are developed.

It was our hope that with the essential qualities of orthodontic wires, well described by fifteen or twenty orthodontists, the actual requirements for an ideal material might be determined, and then possibly such a material itself be produced. The manufacturers have cooperated splendidly with us at the Bureau, and I believe will really welcome standardization in all gold products and perhaps in all other dental products. Certainly the orthodontist would be greatly benefited if he did not have to try experimentally every new alloy which is offered, in order to feel sure that he is not missing some good thing. Usually it is an expensive procedure and one that often ends disastrously.

As indicated in the program, Dr. Taylor, one of the American Dental Association research associates at the Bureau of Standards, is to read a paper on the subject of this research which must necessarily be in the nature of a preliminary report, because the investigation has been under way only a short time, but I feel sure he will interest you because of the thorough manner in which he attacks any subject and his illuminating manner of presenting it.

Another problem which is of interest to every member and deserves perhaps some mention, is that of the cost price to the orthodontist and the dentist of materials which he uses in his daily practice. I have received during the year two or three letters relating instances in which materials are offered to the profession at a profit of several hundred per cent, and the feeling seems to exist that we are often greatly imposed upon in specific cases, and in general that prices are based on war-time conditions; that is, that while the cost of basic materials which enter into the composition of many products has been greatly reduced in price, notably platinum, the cost to the consumer of products containing such basic materials is the same as when these materials were many times as high as they are at the present time. I am referring to this because it has been suggested to me by different members that it is a subject that should be looked in to, and while I agree that this is the case, I nevertheless appreciate the difficulty the manufacturers are under in scaling prices up and down to meet the market price on the various materials of which many of the much-used articles are composed. Furthermore, many of the manufacturers have been under a heavy expense in maintaining

research departments. This will not be so necessary if we continue our own researches to the point of standardizing our materials and drawing up specifications for them.

I must not close without referring to the orthodontic and dental congresses which are being held in Europe this summer. Owing to economic conditions in this country, the attendance from America will probably be small and this is to be regretted, because it is our desire to support strongly our confreres on the other side, as we look to them for support here. I take the liberty of urging as large an attendance from this Society and from the component societies as possible, and I am sure that I voice the sentiments of the entire membership in extending our good will and best wishes to the officials of the International Orthodontic Congress, to be held in London, July twentieth to twenty-fourth.

Among those activities in which we are especially concerned, there is another to which I wish briefly to refer, although there will undoubtedly be a report concerning it submitted at this meeting. It is the Orthodontia Board, which I am happy to say is in excellent running order, having survived the shocks of organization and made sufficient progress thoroughly to justify its existence. Quite a number of applicants have already received the certificates which the Board issues, and I understand there is quite a large number of applicants at present who will come before the Board at the meeting to be held this week. Personally I feel that those who have worked so hard to carry it through the period of organization to its present creditable position are deserving of the highest praise and the thanks of the Society.

Through the year our Committee on Legislation has been working on a revision of the Constitution and By-Laws, and a most comprehensive report has been prepared. I have read this but have not been able to study it sufficiently, in comparison with the old Constitution and By-Laws, to offer any recommendation at this time, but when it is presented to the Society I hope the members will give it conscientious and unprejudiced consideration.

During the year some notable men have passed from the ranks of dentistry and orthodontia, men whose influence has been so wide and pronounced that their death is a great loss to the profession. Certainly none of the older members of this Society and perhaps no member can contemplate this gathering of the members of the American Society of Orthodontists, the first meeting to be held since the death of one of its founders, Dr. Edward H. Angle, without experiencing a deep feeling of regret. As president I took the liberty of writing Mrs. Angle expressing the deep sympathy of the entire membership of this Society on the occasion of his death.

Another notable man whose passing recently from the ranks of dentistry means a distinct loss to this Society, although he himself was not an orthodontist, was Dr. Thomas P. Hinman, of Atlanta, Georgia. I need not enumerate here the many honors he has received. That is history, but besides the keen and helpful papers and discussions which he has given before this Society and which we shall miss in the future, the members experience a deep personal sense of loss, because he was one of the most lovable of men and personally

known perhaps to more of the members than any other who was not an orthodontist. I felt justified in wiring his family the deep regret and sympathy of the members of this Society.

In closing I wish to express my sincere thanks and appreciation for the splendid cooperation of all the officers and the members of the committees during the year; a cooperation which has, I believe, produced as good a program as we have ever had, and let me express the hope that this meeting like those in the past may prove an inspiration to each member to renew his interest in the Society and in the profession, and to rededicate his efforts to their advancement.

THE RELATION OF MALNUTRITION TO DENTAL PATHOLOGY*

By John Albert Marshall, D.D.S., Ph.D., San Francisco, Calif.

MORE than seventeen hundred years ago, Galen (A.D. 191) stated an hypothesis which has yet to be disproved, namely, that dental decay is related to disturbances in the various complex functions of nutrition, and that one of the early symptoms of this disturbance in function is the alteration in the structure of the teeth. But it is only within the last ten years that experimental evidence has been gathered which is of sufficient importance to justify this claim. The temptation to generalize from animal experiments and to apply such generalities to the human family is always persistent, but, nevertheless, must be met with caution. If by means of laboratory observations an hypothesis may be offered in explanation of some of the conditions seen in the clinic, it is necessary that this be tested by every known means; for unless these tests can be successfully passed, the hypothesis must fail. Furthermore, conclusions which are drawn from animal experiments cannot truthfully be said to apply with the same degree of force to man. With these reservations in mind, therefore, may we review briefly some of the experimental work which has been presented on this exceedingly important subject, and then trace the attempts which have been made to apply the laboratory conclusions to the clinical aspect of preventive dentistry. If in the recital of these experiments too much emphasis is placed upon the historical aspect, it is done with the idea that advancement in any science is necessarily slow and that theories which we accept today as true have been the result of long-continued trials and tests.

Physiologists and biochemists have stressed repeatedly the analogy of the mammalian body to a chemical factory. Before work is performed in the factory, energy must be supplied, but the manner in which the living organism obtains its energy was not demonstrated until 1776 by the two great Frenchmen, Lavoisier and La Place. These two experimentors studied heat and energy by means of an apparatus which they invented, called a calorimeter.†

The manner in which mammalian life maintains its body temperature is by combustion. Carbon is burned to carbon dioxide, a process analogous to

*Aided by grants from the American Society of Orthodontists and the Board of Research of the University of California. Conducted at the George Williams Hooper Foundation for Medical Research and the College of Dentistry, University of California.

Read at the thirtieth annual meeting of the American Society of Orthodontists, St. Louis, Mo., April 21 to 24, 1931.

Copyright 1931, by John A. Marshall.

†An animal was placed in a cage, and the heat of the body melted ice packed in the container which surrounded the cage. During the course of the experiment, the water was collected, and later was weighed. An outer layer of ice prevented the heat of the room from hastening the melting of the inner layer. The time which it took to collect 1 gram of water was used as a part of the measure of the heat generated by the animal. It was found by these experiments, and others in which the respiratory part of the problem was studied, that a guinea pig, in ten hours, burned up 3.33 grams of carbon. This amount of carbon liberated sufficient heat to melt 326 grams of ice to water at zero degrees Centigrade. As an actual matter of fact, the amount of ice melted in ten hours by the guinea pig was slightly in excess of this figure, namely 402 grams. But, taking into account the crudeness of the apparatus, this agreement between the calculated and the observed amount was considered very close.

that which occurs when coal is used as a source of energy in a chemical factory. In order that the mammalian machine may work, sufficient energy for the proper function of each individual cell must be at hand. The various articles of diet which make up the energy intake were studied later in an exhaustive manner by means of improved calorimeters, and also by analytical methods; but it soon became apparent that the ideas of the early experimentors in this field demanded further revision, and from their crude apparatus there was developed by Atwater and Rose-Benedict a respiration calorimeter large enough to test heat production and utilization in human beings.*

The effects upon individuals of diets high in carbohydrates, fat, and protein were studied. Various imposed conditions of work or rest were carried out, and from these experiments it was possible to speak with some degree of accuracy as to the diets which were most favorable to well-being.

In this reseach, which was performed from 1900 to 1904, the main object was to determine the metabolic rate of subjects receiving a certain number of calories, or heat units, per day. The results have provided a very definite knowledge of the energy requirements of man under various conditions of sleeping, waking, sitting, walking, or light or heavy work. It was found, for example, that carbohydrates and fats can replace each other to a very great extent, and, in the absence of either of these, the energy requirements are derived from proteins. But, although fats or carbohydrates may be substituted for one another, there is no substitute for protein; that is an essential part of all animal diets. All proteins, however, are not the same. Some are more suitable to meet the requirements of a certain species of animals than others. The proteins taken in by the herbivores would be poor feeding for a carnivore, while the omnivore utilizes proteins from both animal and vegetable kingdoms. The experiments demonstrating the truth of these statements were not chemical alone, but were rather biochemical in their method and execution.

Up to this time, it had been considered entirely adequate to subject a foodstuff to a chemical analysis. By this means it was found that if living matter be analyzed, certain portions of it could be removed or extracted with alcohol and ether, and other portions with water. There still remained, however, insoluble organic matter which was found to consist of 52 per cent carbon, 7 per cent hydrogen, 15 per cent nitrogen, 1 to 2 per cent sulphur, about 0.2 per cent phosphorus, and a varying percentage of oxygen, up to 23 per cent. This residue was called in the very beginning by Mulder (1839) "protein" from the Greek word πρότεος, meaning preeminence. Proteins are constructed of certain chemical groups which possess distinctive chemical properties. These groups, or amino acids, have been likened to bricks in a building, and are held together by chemical affinities, or bonds, which, under the processes of digestion, may be easily or difficultly broken down, and then either absorbed or excreted unchanged. For example, a diet of albuminoids, such as hair, nails, and hoofs, would not be tolerated nor digested by the animal organism. These epithelial structures are built up within the body

*It is so constructed that all of the products of combustion leaving the chamber are measured accurately. Furthermore, the intake of air and the amount of food and moisture are definitely known.

from chemical compounds of the protein series. The particular building stones occupy, in some cases, very important positions; indeed, it has been found that some of them are so essential to life that the animal will not survive if certain amino acids are withdrawn from the diet.

Growth of any organism, whether animal or vegetable, consists essentially of three parts, all interrelated. The first has to do with the enlargement of cells, the second with the multiplication of cells, and the third with the deposition of intercellular substance. Connective tissues such as muscle, bone, cementum, dentin, pulp, and peridental membrane, are recognized mainly by the intercellular substance rather than by the structural characteristics of the individual cell. This is not the case with epithelium, for in this instance the cells themselves are clearly differentiated from the relatively small amount of intercellular substance found in the tissue.

The study of experimental diets in laboratory animals involves mainly the measurement of the increment of tissue in an arbitrary unit of time. This unit of time is found, by careful observation of a great number of animals, to be relatively constant, when the adequate diets and other environmental conditions are at the physiologic optimum.

Significant lowering in growth rate is indicative of malnutrition. In addition, certain species of animals show differences in gait, in ossification of bone, in reactions to mazes, in roughness of coat of hair, and, finally, in changes in dental structures. The research worker, therefore, is confronted with this question: What factors determine overgrowth and undergrowth for certain age limits? If increment of tissue can be speeded up or retarded, does this give a satisfactory answer to the problem of adequate nutrition, or the lack of it?

When diets are fed which consist of 80 per cent carbohydrates, an increase of growth is noted. But it may be observed in passing that this is due to the careful selection of the remaining dietary constituents. They are present in what is computed to be the maximum value to the animal.

When a comparison is made of high protein diets, it has been observed that such a regimen may be accompanied in an animal by hypertrophied kidneys. Furthermore, the utilization of protein is a much more complicated process, apparently, than that involved with carbohydrates. Every breath taken into the lungs of terrestrial animals contains an appreciable amount of nitrogen, but the requirements of the body for nitrogen are not met except through the alimentary canal. The utilization of nitrogen, as has been pointed out by Mendel, must come from the digestion of properly balanced protein. The selection of suitable protein depends upon the utilization of the elements of the protein molecule, the amino acids, of which there are about twenty. Indeed, some proteins contain radicles which are essential to the processes of reproduction and growth; others can be built up within the organism. Hopkins, as well as Mendel and Osborne, studied animals maintained on zein. If this is the only protein supplied, the young experimental animals will stop growing, and, after a time, succumb. The reason for this is that zein does not contain a sufficient amount of one amino acid, lysine, and none of another, tryptophane. It is not entirely correct to say that the diet was deficient in

protein, but rather that the diet contained an abundance of a deficient protein, deficient in so far as its so-called building stones were concerned.

These experiments upon protein paved the way for others performed later, on the action of the mineral salts and on the function of vitamins. It is of these two latter subjects that I wish to speak, at least in so far as an application may be made to preventive dentistry. The fundamental experiment upon which has been based a great number of research problems, was that performed by Jacques Loeb, and described in his book, *The Mechanistic Conception of Life.* Loeb used as his material for observation, the eggs of the sea urchins and of other salt water animals. He showed that crustaceans die if placed for thirty minutes in a solution of common salt (NaCl) which has the same degree of concentration as sea water. When a little calcium chloride is added so that the resulting proportion is the same as in sea water, death occurs just as quickly. But if a solution of three salts is made, namely, sodium chloride, calcium chloride, and potassium chloride, this solution supports life, provided it is of the same percentage composition as found in sea water. There is, then, as interaction, or a balance, existing between inorganic salts. If this balance is disturbed, or if one or more of the substances are left out, the cells suffer accordingly.

The chemical work which is performed by living cells is accomplished by the processes known as diffusion and osmosis, between the cell and its environment. Certain substances pass through the cell wall very readily, and others do not. This so-called semipermeability is controlled by the nature of the membranes which surround or limit the cell. It may be, as Overton has suggested, that this membrane consists of fatty substances, or lipoids. It is certainly true that the life processes of individual organisms depend upon a constant exchange between the fluids of the cells and the fluids and dissolved substances found in the medium which surrounds the cells. This point is rendered more clear when the statement of Wells[1] is recalled in his discussion of the connection between physiology and pathology. It is to the effect that the relationship of these two sciences represents an effort to change *nondiffusible* substances into *diffusible* ones. For example, such relatively nondiffusible colloids as starch, protein, and fat are rendered diffusible by the various processes of digestion, and become, respectively, glucose, amino acid, fatty acid, and glycerol. In this changed physical state they are absorbed and stored, later utilized when needed, and the end-products excreted. But when excretion is interfered with, disease may follow. The intermediate products of metabolism are carried readily by the blood stream and lymph channels to various parts, where they are reconverted into colloidal or crystalloid substances, and become a part of the body. In these processes of diffusion, the inorganic salts play an exceedingly important part, and those which are concerned most with skeletal growth are calcium and phosphorus.

The biochemic and histopathologic changes occurring in rickets and osteoporosis have been produced experimentally, as shown by McCollum and his coworkers, in this country, and by the Mellanbys and Telfer, in England, by feeding various deficient diets, such as one low in lime but containing an adequate supply of phosphorus. When calcium lactate was added to the

ration, skeletal growth recommenced. In addition, McCollum and others have shown that decalcification of bones can be produced, curiously enough, actually by feeding the animal too much calcium, thereby upsetting again the balance between the phosphorus and the calcium. It is in effect another example of the conditions which may be produced when the balance between the various inorganic salts (referred to in the sea urchin experiment) is upset. This relationship may be also altered by withholding vitamins. The experimental evidence which has been accumulating in the last few years on this point is enormous. McCollum, Mendel, Sherman, Steenboch, Howe, in this country, as well as Drummond, Telfer, Widdows, the Mellanbys and many others in England and the United States have all contributed important facts bearing upon this problem of calcium utilization by the body. May I quote from an earlier paper:

"If the dietary habits of animals are observed, it becomes evident that they instinctively choose the right food. Human beings do not. The senses of smell and taste have become changed through environment. Man lives in a superficial age, where things must possess certain flavors, must give out certain aromas, before they are palatable. One of the effects of civilization has been pure food. The uncivilized races, whatever their sins of personal hygiene may have been, sins of omission perhaps, showed at least this virtue: that they ate, unknowingly, of course, food which contained all the necessary elements for the upbuilding of the body. An analogy has been drawn between building of a body and building of a house. Nails and paper are as important as lath and board. These, in turn, must rest securely upon an adequate foundation. Similarly, in building a body for health, it is necessary that a wise choice be exercised in the selection of various foodstuffs, not only in the kind, but also in the amount and the quality." From the raw materials with which we start life—milk, water, vegetables, bread, butter, meat, and fruit—an anatomic structure is built, which we call, for want of a better name, the human organism. If, during the process of building, or even afterward in the maintenance of this physical entity, the house suffers from a storm (in this case, fatigue, malnutrition or infection, or other accident), then the rebuilding must begin, and extreme care be taken that none of the weaker members of the structure suffer unduly. When the idea of physiology first dawned on man, it was thought that by understanding the meaning of the term "health," the various ailments could be successfully treated, and this is as true today as it was in the time of Galen. But it is only within the last few years that the importance of some of the smaller things has been appreciated.

We can forego, temporarily, vitamins or fats or proteins from our diet, and not experience any suffering; what the eventual results of a continued vitamin restriction would be, we are only now beginning to realize. It has been said by many observers that one of the effects of this restriction is to be seen today in the large child hospitals in the East. More than 90 per cent of the children coming to these institutions for treatment give evidence of rickets. They show both bone abnormalities and dental hypoplasia. Some of these are of an inconsequential character; others, very serious. The rapid

improvement of such cases which has been obtained, is mainly ascribed not only to the effects of a corrected diet, including vitamins, but also to sunlight, real or artificial. In all cases, there is a renewed activity in the bone-forming cells.

Only twelve years have elapsed since Dr. Edward Mellanby, in a report before the Physiological Society in England, made this significant statement:

"If children are to have the best chance for a healthy existence, until further work extends or modifies my experimental results, it would be safer to exclude all vegetable oils from their dietary."

He pointed out also that the work of Mrs. Mellanby had demonstrated that the accessory food factors, the vitamins, exert an important influence upon the development of the teeth. Unless there is an abundance of antirachitic vitamin in the diet, the "deficiency at any period will be reflected in the calcification and probable uneven arrangement of the teeth."

The work of the English scientists was performed on dogs placed on diets variously deficient in several respects. Mrs. Mellanby's objections to the use of rats for experimental purposes are based, apparently, on two statements: first, that these animals have only one set of teeth and, second, that it is difficult to obtain exactly comparative results on the amount of food eaten. Her preference for dogs is thus summarized: this animal, like man, is omnivorous (as is the rat) and can be kept readily in excellent health up to eight years. (The span of life in the rat is three years.) She states that puppies are more susceptible to rickets than rats. (Although the bone lesions are similar to rickets, they are not identical. However, hypoplastic teeth are a common result under such a controlled dietary regimen.)

But the rat also offers particular advantages for laboratory work. McCollum and his colleagues, in a discussion of a choice of animals, point out several facts which indicate that dogs are less suitable for laboratory experiments than rats. Not only are they very liable to the direct effects of intestinal worms, but they may develop other intestinal disturbances, as well as deformities and infectious disease. But the rat, on the contrary, thrives under laboratory conditions and "is therefore the animal of choice for studies of nutrition." Furthermore, of all terrestrial mammals, the rodents show by far the widest distribution. There are several factors responsible for this. First, they are capable of adapting themselves readily to their environment. Second, they are exceedingly fertile—an average of forty-four young during the life span of the female. Third, they exhibit a great ability to obtain and to masticate food. Among the rodents, only the rat possesses two types of teeth. The incisors grow from a persistent pulp; the molars do not, but their formation is completed about the sixtieth day, and they are comparable in most anatomic respects to human molar teeth.

There is an additional dental characteristic of the rat which is of aid in studying the nutritional effects on teeth. The work of Erdheim, in 1906, on the parathyroid glands proved that the disturbances he was able to produce in calcium metabolism were reflected in the incisors of the rat, but not in the molars. This was due to the constant growth through life of the four anterior teeth. In one animal, therefore, it is possible to gauge the various nutritional

defects produced, both on teeth growing from a persistent pulp and on those in which formation is completed. But the lesions found in the molar teeth of the rat are more comparable to human dental pathology than those observed in the incisors. McCollum's results, as well as those of Mellanby, Howe, and Marshall, confirm the fact that even gross defects are produced in teeth following the administration of diets deficient in certain nutritional elements. But the histopathology of these tissues is even of greater interest and significance. When it is recalled that these various experiments have been conducted on dogs, guinea pigs, monkeys, and rats, and that similar dental lesions have been observed in every case, the findings become increasingly suggestive. McCollum's reports, for example, include a description of:

(1) caries-like lesions in the molars,
(2) loss of attaching tissues of the teeth and also of the teeth themselves,
(3) fracture in both molars and incisors,
(4) formation of osteodentin,
(5) pulp exposure,
(6) overgrowth of incisors.

The lesions of the molar teeth resemble caries of human teeth in the following respects:

(1) the initial lesion in a deep enamel sulcus is very small and enlarges slowly,
(2) a rapid involvement of dentin and the associated undermining of enamel walls,
(3) the laminated appearance of the carious dentinal detritus,
(4) the eventual pulp infection and subsequent bone involvement.

Other workers have confirmed these findings by histopathologic examination.

Mrs. Mellanby,[2] in her report, points out very emphatically that experiments which have been conducted by her for the last few years indicate that the anatomic characteristics of teeth and jaws can be altered almost at will by specially selected diets. The alteration consists in developmental defects of both gross and microscopic appearance. Although the earlier work indicates that vitamin A favors the development of well-calcified teeth, more recent experimental work has shown that another factor is likewise concerned. About the time that this report was published, it was found that vitamin D, now recognized as a separate entity, plays an exceedingly important part in calcification. The natural supply of this vitamin is found in egg yolk, milk, beef suet, and cod liver oil.

Having, then, this laboratory evidence dealing with diets deficient in vitamins, the question arises as to what other nutritional elements lacking in experimental diets, produce dental defects. The experiments of McCollum and his coworkers have shown that normal osseous growth and dental development are favorably influenced by a diet containing, first, an optimum amount of certain vitamins; second, an adequate amount of physiologically

balanced protein; and third, a definite relation between the percentage of available calcium and phosphorus. The oral defects were greatest in those animals placed on diets low either in fat soluble A vitamin, or deficient in protein, or in which there was an unbalanced calcium-phosphorus ratio. Since none of the dental lesions were observed in the control animals, it is reasonable to conclude that the experimental diet was responsible for the pathologic conditions.

Boyd and Drain, of Iowa, have carried forward the research into the field of clinical application, and their experiments, when considered with those of Mrs. Mellanby, indicate the possibilities to which controlled diets may be advantageously applied. Furthermore, Tisdall, Drake, and Brown[3] report that favorable results were observed when children were given a special cereal mixture containing vitamins and mineral salts.

The work of Hanke, at Chicago, also demands mention. By recommending that the patients under his observation take a pint of orange juice daily, he has reported improvement from effects of marked malnutrition. The study is being devoted to the water-soluble rather than the fat-soluble vitamins. But a final criticism of this research must be delayed until some parts of the problem can be repeated and verified.

There are not available in the literature descriptions of dietary experiments on monkeys which permit conclusions to be drawn as sharply defined as those relating to rats, dogs, and guinea pigs. There are several reasons for this. First, that the animals are more expensive to purchase; and second, that they do not submit so well to dietary restrictions—they prefer a "hunger strike"! Although Howe has made many general statements upon his experiments with guinea pigs and monkeys, some details of the work are still unpublished.

The American Society of Orthodontists has received reports upon the results obtained thus far with monkeys having orthodontic appliances of various sorts placed upon the teeth. Up to this time the outstanding differences in the degree of absorption which have been observed may be summarized as follows:

First, that independent of the type of appliance used, absorption on either the lateral or apical aspect of the root has been observed under conditions where unusual force was applied. This process seems to develop more quickly and proceed farther where the diet of the experimental animals is deficient in ingredients containing vitamin A. Although there are many difficulties in the matter of imposing and maintaining restricted diets on monkeys, there have been accumulated sufficient data to state that in cases at least of vitamin A deficiency, the animals fail to gain in weight and seem to be very susceptible to infection. This infection may localize either in the respiratory or alimentary tract, but there have been more instances of the latter than of the former. Furthermore, these animals on a diet low in vitamin A not only show a greater degree of dental absorption but give evidence likewise of a lowered tendency toward rebuilding of bone. The cases where the greater amount of new, hard tissue has been formed, are those in which the animals were on a full diet.

There are experiments on other animals which confirm this in a slightly different manner, For example, when dogs are placed on certain deficient diets conducive to rickets, it has been reported by the author that the resorptive processes, normally active at a certain age on the roots of deciduous teeth, become slower and slower, till finally the animal not only fails to shed the first set of teeth at the usual age limit, but also is correspondingly slow in erupting the permanent teeth.[4]

Lately additional evidence has been secured from an examination of material kindly sent me by Professor L. B. Mendel and Dr. Alfred H. Shohl.

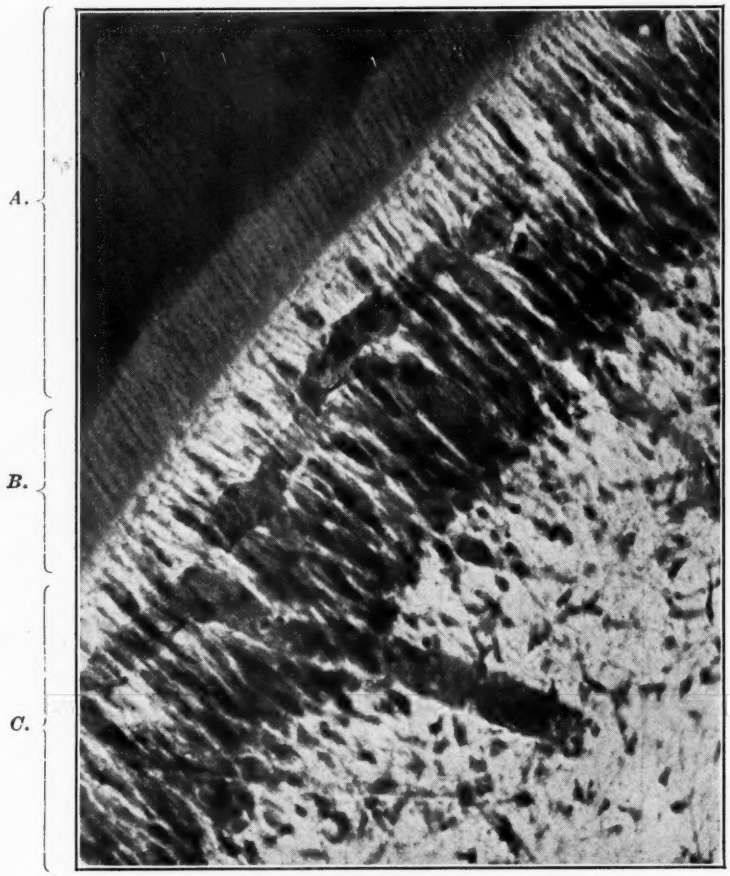


Fig. 1.—*A*, dentin; *B*, predentin; *C*, odontogenetic layer with rich capillary network of blood vessels. Specimen from normal animal.

When the dental papilla of the unerupted permanent teeth in a so-called "normal" dog is examined, several outstanding characteristics will be found. First, the odontoblastic layer is fully formed and apparently actively functioning, and is supplied by a rich capillary network. The zone of predentin is narrow and fairly even in its contour (Fig. 1). The young fibers in the predentin are evenly distributed throughout and are of regular size, shape and direction (Fig. 2). Likewise the enamel matrix shows a definite regularity in extent of formation (Fig. 3).

Mrs. Mellanby has described and commented upon an interesting point in this connection; namely, that enamel formation is not a single stage proc-

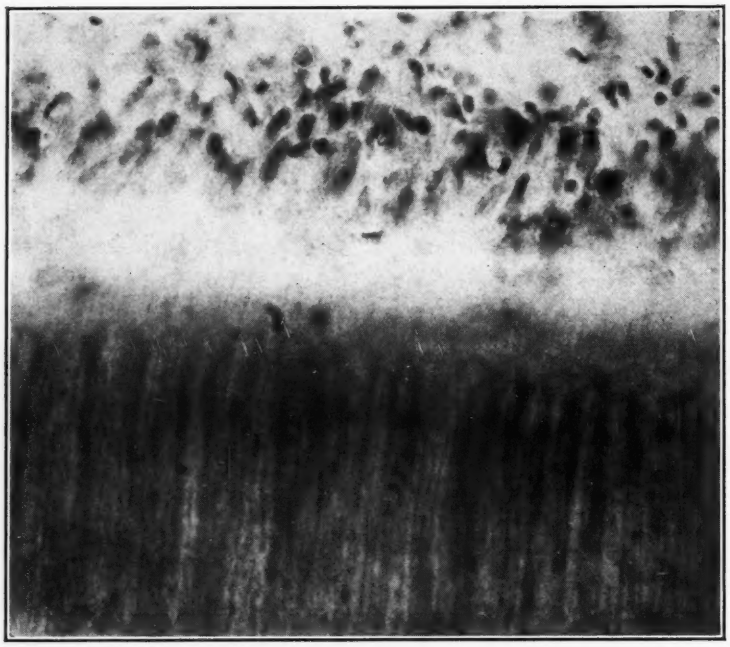


Fig. 2.—The fibers in normal predentin are evenly distributed throughout the tissue.

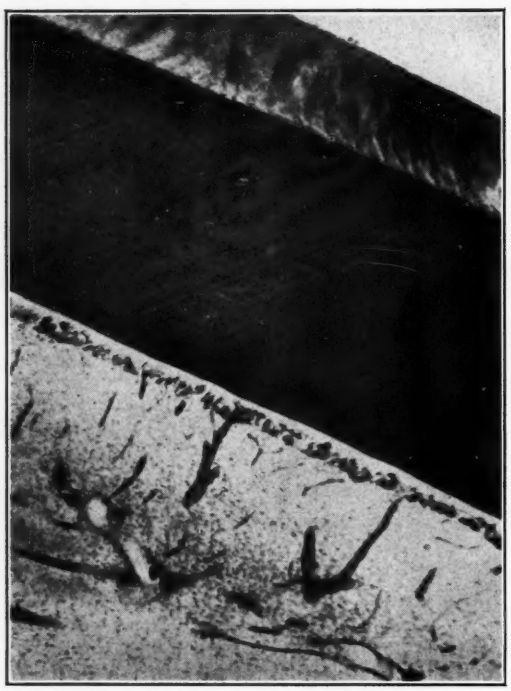


Fig. 3.—Animal on full diet. Note the even, regular distribution of tissue elements and actively functioning odontogenetic layer.

ess, but, on the contrary, one in which there is first a formation of matrix, and later the deposition within it of the calcium salts. Fig. 3 demonstrates this preliminary stage.

The beginning of the process by which deciduous teeth are shed under normal conditions is illustrated in Fig. 4. It will be observed that the enamel organ of the underlying permanent tooth is developing near the apex of the deciduous tooth root. The break in its cementum and the ragged outline of the dentin are characteristic of the earlier stages of normal resorption and were described in detail in an earlier paper.[5]

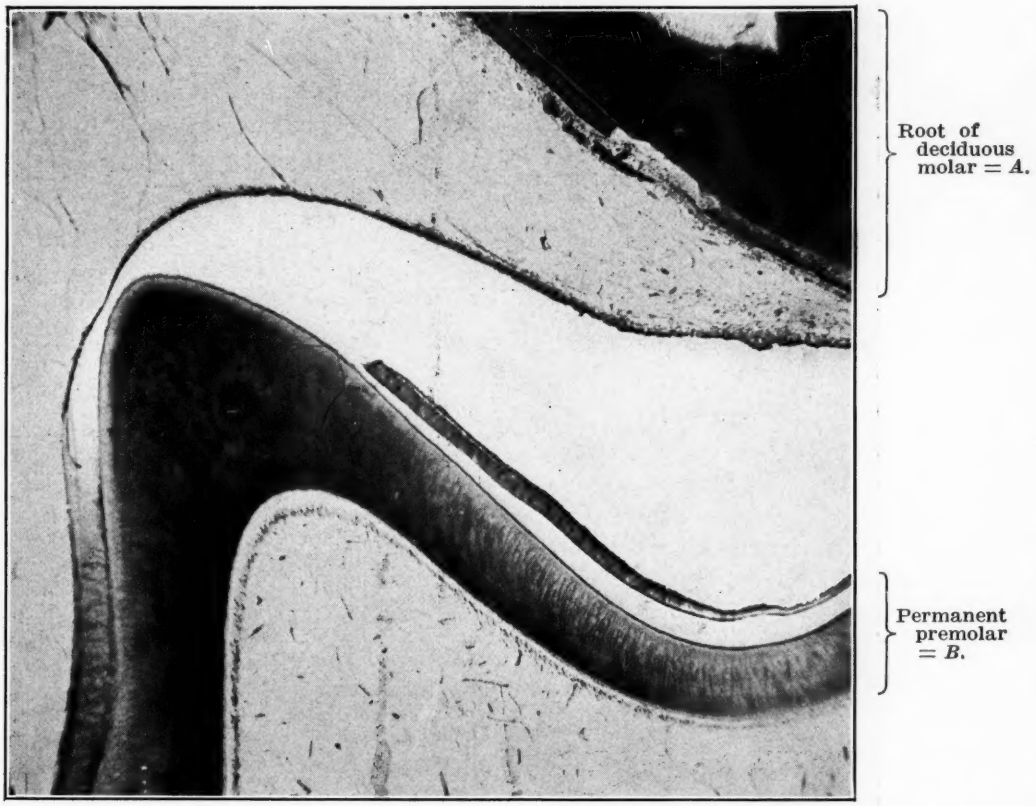


Fig. 4.—Resorption just beginning on root of deciduous molar from animal on normal diet. *A*, root of deciduous molar; *B*, permanent premolar.

But both the deciduous and permanent teeth in rachitic dogs are quite different. For example, in Fig. 5, although there is some evidence of a very slowly developing resorptive process, the tissue reaction is not comparable to that found in the normal animals. Furthermore, the radicular dentin of the deciduous teeth and the coronal dentin in the permanent teeth are both characterized by outstanding features. It will be noted that the line between the dentin and predentin is not even and straight as is illustrated in Fig. 1. Instead there are globules of calcified material unevenly distributed in the greatly enlarged zone of predentin. Furthermore, the fibrils in the predentin occur in irregularly placed bundles (Fig. 6). The odontoblastic layer appears to be degenerating and does not possess as rich a blood supply as in the normal animal.

Thus it is seen that additional evidence from a totally different type of animal supports that already described as characteristic of teeth of monkeys on deficient diets.

There is an increasing number of facts which indicate that pulps of deciduous teeth must be regarded in an entirely different light from pulps of

Fig. 5.—Deficient diets show their effects both in deciduous and in permanent teeth. Note zones of uncalcified dentin in root of deciduous molar and unerupted crown of permanent premolar. *A*, root of deciduous molar; *B*, crown of permanent premolar.

permanent teeth. In the first instance the pulp serves two functions under normal conditions of growth. It serves both as a dentin-forming organ and later, when radicular dentin is about to be broken down, as a dentin-destroying organ. The pulp in permanent teeth, however, does not normally act in

the latter capacity. It is only when an injury is suffered of a low degree of intensity that the pulp is stimulated into resorptive function. The normal process of apical resorption is not confined to the activity of the cells in the peridental membrane. It is transmitted in varying degrees to the tissues of the pulp.

The formation of pulp stones I regard as an indication of an injury less severe than one producing radicular resorption. This injury may be due to malnutrition, to infection, long-continued irritation, or other unusual conditions. In deciduous teeth, the pulp plays a very important part in the physiologic process of radicular resorption. In permanent teeth this is not the case.

May I make this comment on the use again of the words "resorption" and "absorption," and in this connection quote from a note on the subject by A. W. Meyer:

Fig. 6.—Note the fibers clumped together in loose bundles in the predentin, also the globules of dentin irregularly formed and dispersed throughout the predentin. *A*, predentin matrix; *B*, dental papilla; *C*, enamel matrix; *D*, dentin.

"Although I generally use the word resorption for the removal of skeletal substances by life processes, I cannot give any good reason for doing so. Neither the word absorption nor resorption is used in the *literal* or in the *physical* or *chemical* sense in this connection, but merely to indicate the *loss of substance*. We still speak of the absorption of substances such as blood and exudate, and also of fat from the intestine. No one who uses the term absorption for the removal of bone, thereby implies that the osseous material is removed by a purely physical process such as the taking up of water or a substance by a 'sponge process,' as the technical use of the word implies. Since the loss of osseous substance no doubt is due to a chemical process involving decalcification and proteolysis, the word resorption conveys this meaning no more than absorption. If I am correctly informed, chemists do not use

the word resorption at all, and some physical and colloid chemists prefer to use 'sorption,' rather than absorption or adsorption, as the case might seem to require, and when doing so, do not retain the meaning of the Latin root, but give the term 'sorption' an entirely different meaning.''

In view of the fact that the shedding of deciduous teeth is regarded as a manifestation of normal growth of jaws, it was designated originally by G. V. Black and others, as ''resorption.'' But the term absorption was restricted to pathologic processes, and therefore applied to the loss of either osseous or dental tissues, resulting from injury or disease.

Not all authors, however, agree upon the use and interpretation of this word. For example, one author states[6] ''Resorption (Latin, *resorptio,* from *re,* again, and *sorbere,* to absorb), the process whereby formed tissue is converted into its original elements by the action of specialized cells and taken into the blood current by absorption.'' Unfortunately, this definition has been overlooked by others interested in this problem so that the resulting confusion of the literature has reached a point where a critical review seems necessary.

In the earlier reports which I have published I had in mind this fact: That normal processes such as occur about the roots of deciduous teeth have properties characteristic to themselves and thus deserve and require differentiation from other processes essentially pathologic. It has been suggested that the terms ''physiological resorption'' and ''pathological resorption'' be used respectively but these terms to me appear cumbersome. In this predicament it seems wiser to use a term formerly found in American and English literature. Black has described *absorption* of bone as follows:[7] ''An area of bone forming the walls of the alveolus of the tooth is involved by the inflammatory movement, and *absorption* of the bone quickly occurs. The fibers of the peridental membrane of the region elongate as this *absorption* takes place, extending out to and perhaps maintaining some connection with the bone which is being *absorbed,* producing a fan-like projection of comparatively large, fleshy fibers extending out from the apical end of the root to the *absorbed* area.'' (The italics are mine.)

Thus it will be seen that there is sufficient justification for the interpretation of these two words, so that the term ''absorption,'' although discarded in medical literature, has formerly been applied to those lesions of teeth and bone in which the hard substance is broken down, thus leaving a ragged outline of dentin in contact with the inflamed peridental membrane. But ''resorption'' has been restricted to the physiologic process.

In January of 1930 was published the description of the first experiment performed in my laboratory upon the effect of pressure on teeth of the macacus rhesus. Some slight cementum absorption occurred, and there was a marked fibroblastic activity in the region of the apices of the central incisors. But the point of particular interest was the fracture which was found in the alveolar process between the two centrals. This animal was on a full diet.

It is now possible to compare directly this result with one obtained with an exactly similar appliance placed upon an animal on a deficient diet. Im-

pressions and roentgenographs were made of the maxilla on September 14, 1928, and incisor bands placed five days later (Figs. 7, 8, 9, and 10). The movement of the two incisors was in the distal direction. The bands were examined on October 22, November 14, December 12, and found to be intact. On March 13, 1929, the tension on the wires was slightly increased. It was noted a month later that the animal was losing weight rather rapidly, and he was given a regular diet for a few weeks until the weight started to in-

Fig. 7.—September 14, 1928, at the beginning of the experiment.

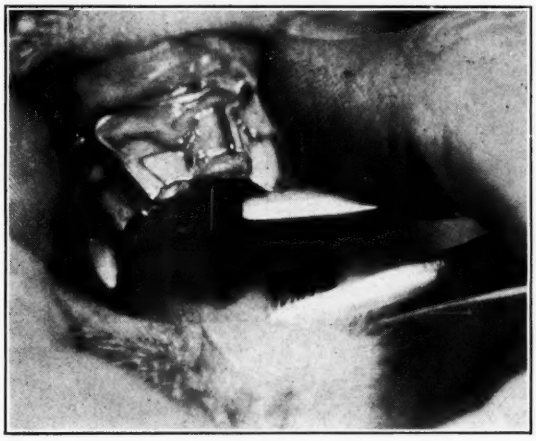


Fig. 8.—Monkey No. 4, beginning of experiment, September 19, 1928.

crease. He was again placed on the special diet on June 5, but succumbed July 2 to a double pneumonia. The bands, then, were in place nine months and a half. In that time the amount of movement duplicated as nearly as possible that obtained with monkey No. 81 that was on a full diet. But the histopathologic picture of the two tissues was quite different. In the case of the normal animal, monkey No. 81, only a very slight degree of cementum absorption was observed. But monkey No. 4 showed a great deal of radicular absorption, and, furthermore, only slight evidence of apposition (Figs. 11 and

12). I attribute this difference in result to the effect of the diet, and not to the appliance, since the appliances in both cases were practically similar.

In Fig. 13 is shown a cross-section of the permanent maxillary central incisor. It will be noted that the pressure transmitted to the root portion of the tooth by the spring wire has produced considerable absorption on the root end, a condition which did not develop in the normal animal having a

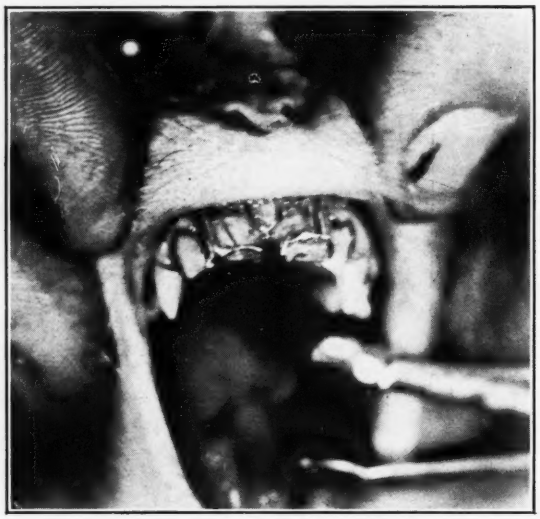


Fig. 9.—Monkey No. 4, bands in place and teeth separated on December 7, 1928.

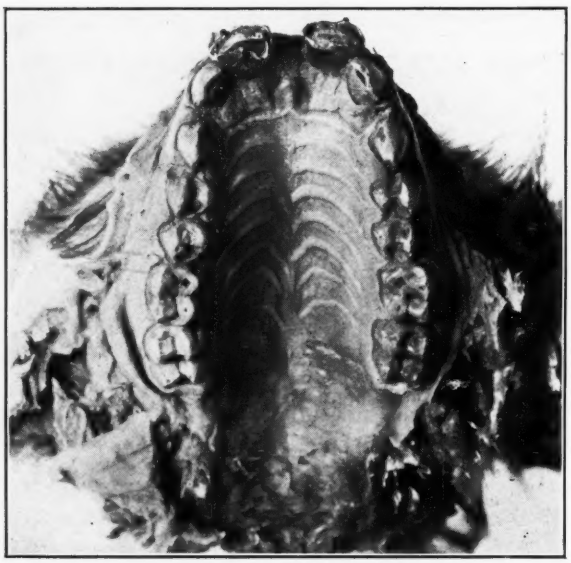


Fig. 10.—Monkey No. 4, at end of experiment, July 2, 1929.

similar appliance. Even under the imposed conditions of strict dietary control and severe tension from the bands, apposition to a slight extent was demonstrated. The nature of the process occurring at the roots of the central incisors is indicated in Fig. 14. This magnification of 900 diameters indicates the irregularity of the outline in the tooth root, and also the great degree of inflammatory reaction occurring directly in the vicinity of the process.

Another interesting point is demonstrated in this animal. A calcific degeneration of the pulp was shown in one of the central incisors. Ordinarily this condition is regarded as sufficient evidence to prove that a low degree of irritation is being suffered by the pulp, an irritation which may be of a bacterial, chemical, or mechanical source. It is found, usually, in the pulp cham-

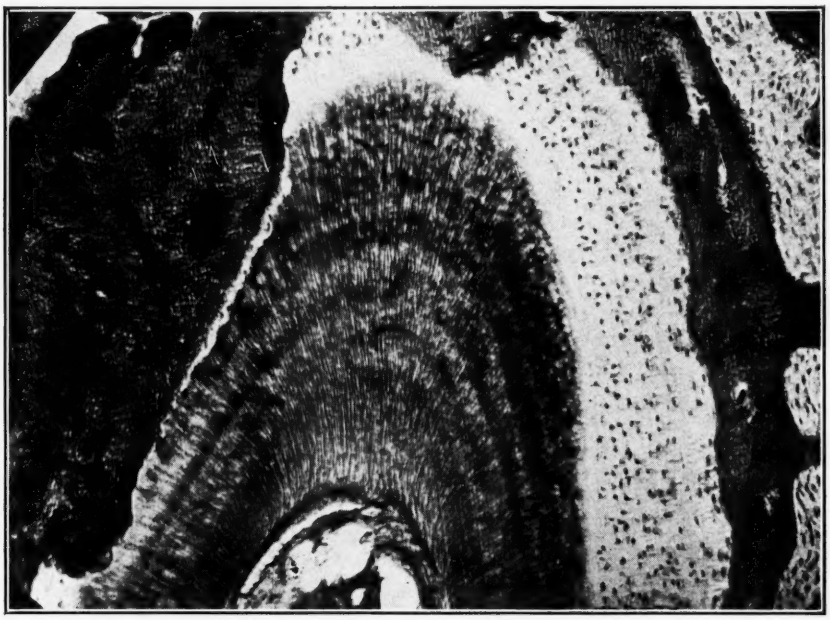


Fig. 11.—Left maxillary permanent central incisor. Transverse section Schmorl stain showing marked absorption on mesial aspect. Monkey No. 4.

Fig. 12.—Higher magnification of left maxillary permanent central incisor, mesial aspect. Destruction of dental tissue has been rapid and severe.

ber, or in the orifice of the canal at the floor of the pulp chamber. In this case, however, it was in the apical fourth of the root, and is shown very clearly in Fig. 15, and under higher magnification in Fig. 16.

It has been observed that rats on deficient diets have shown great tendency to form these pulp stones. Here is additional evidence of the reaction

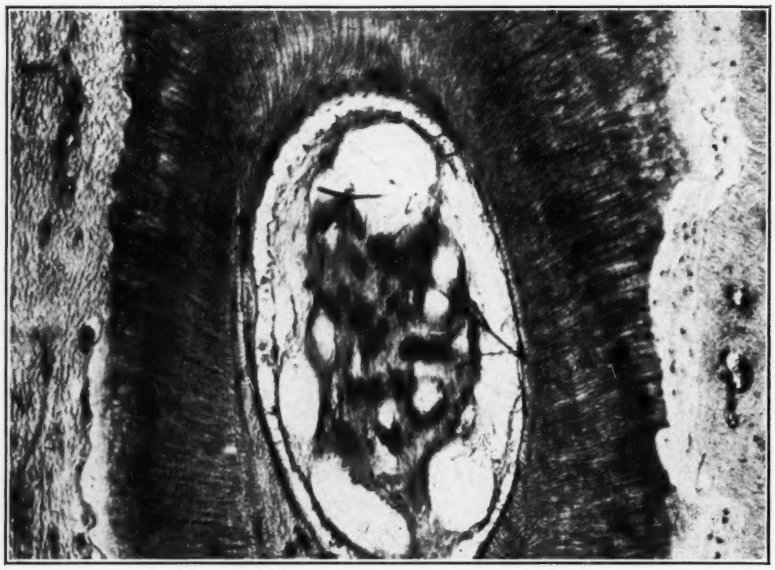


Fig. 13.—Apposition and absorption on same root. Monkey No. 4.

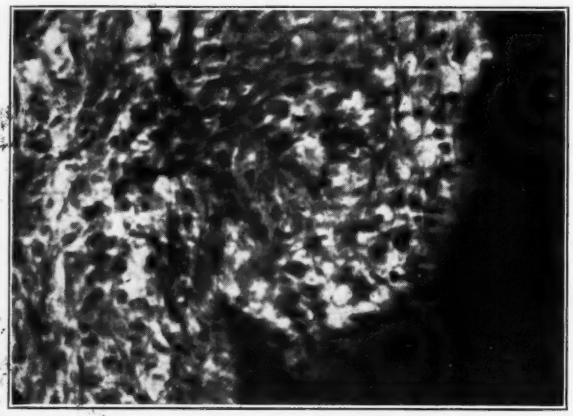


Fig. 14.—The inflammatory reactions in the area of active absorption. Hematoxylin and eosin stain ×900.

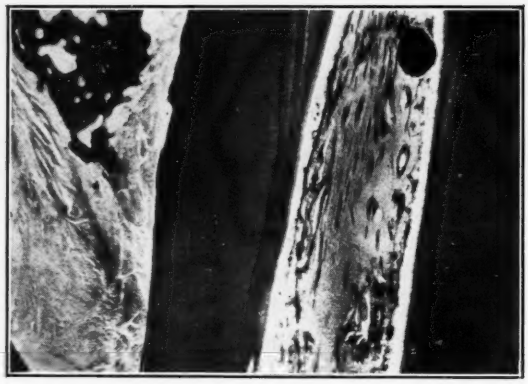


Fig. 15.—Pulp stone in apical fourth of the root in the maxillary permanent incisor.

Fig. 16.—Pulp stone from preceding illustration. Schmorl stain ×220.

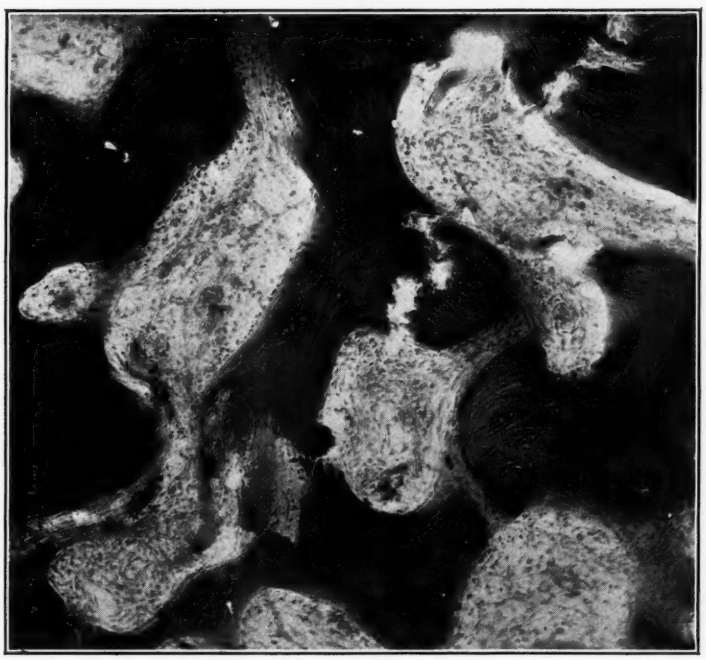


Fig. 17.—The fractured alveolar process between the maxillary permanent central incisors from animal No. 81 on a full diet.

of the pulp to conditions of malnutrition in which mechanical stress may play some part.

A comparison of the alveolar process between the two central incisors is also necessary. In Fig. 17 there is shown the fracture which was produced by the spring wire on the normal animal. In Fig. 18 the corresponding area from monkey No. 4 is shown. This animal was on a deficient diet. In this case, no fracture is observed.

The rapidity with which the experimental animals on deficient diets lose weight and succumb to infections emphasizes a point mentioned by Mellanby in his research on dogs; namely, that the presence of vitamin A in the diet raises quite definitely the bodily resistance against infectious disease.[8] Mellanby remarks that, both in the clinic and in the laboratory, it has been observed that, when diets are deficient in vitamin A, there is a lowered resistance to infections caused by certain types of staphylococci and B. coli.

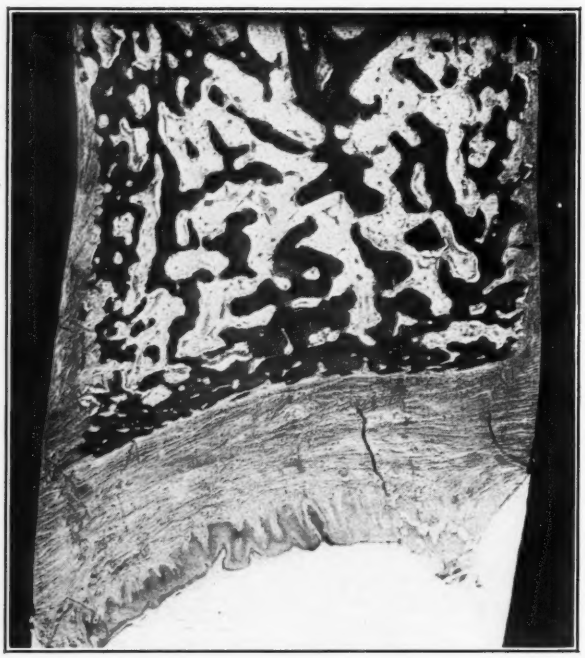


Fig. 18.—No fracture was produced by the similar appliance in animal No. 4 on a deficient diet.

The evidence at the present time all points to this fact: that when experimental animals are maintained on diets adequate as to protein, vitamins, mineral salts, fats, and carbohydrates, deep areas of absorbed tooth structure have not been observed. Furthermore, new tissue is always found in those areas where slight absorption has previously occurred. Osteocementum and secondary dentin are deposited, thus restoring, in a measure, the original outline.

SUMMARY

Experimental evidence dealing with malnutrition presented from various laboratories indicates:

First, that oral and dental tissues of dogs, rats, guinea pigs, and monkeys may develop pathologic lesions as a result of deficiencies in selected diets.

Second, absorptions of tooth structure occurring near the apices of permanent teeth are found more frequently in animals that have been maintained on a diet low in vitamin A. The absorptions are of greater extent in these animals than in animals on a diet in which vitamin A is supplied.

Third, there is evidence also of a less amount of redeposited tissue, osteocementum, in animals on a diet deficient in vitamin A.

Fourth, from the observations so far made, it is apparent that the type of appliance has less to do with the degree of apical absorption than have the diet and the amount of pressure applied to the teeth by orthodontic bands.

REFERENCES

1. Wells, H. Gideon: Chemical Pathology, Philadelphia, 1925, W. B. Saunders Company.
2. Mellanby, May: Diet and Teeth, Medical Research Council, Special Report Series, 140, 1925, London.
3. Tisdall, Drake, and Brown: Am. J. Dis. Child. **40**: 790, 1930.
4. Marshall, John A.: J. A. M. A. **81**: 1665, 1923; J. A. D. A., January, 1924.
5. Marshall, John A.: Studies in Apical Resorption of Permanent Teeth, INTERNAT. J. ORTHOD. ORAL SURG. & RADIOG. **16**: 1035, 1930.
6. Marshall, J. S.: Operative Dentistry, Philadelphia, ed. 5, 1920, J. B. Lippincott Company.
7. Black, G. V.: Special Dental Pathology, Peridental Membrane and Dental Pulp, Chicago, Medico-Dental Publishing Co.
8. Mellanby, E.: Brit. M. J., page 677, April 12, 1930.

DISCUSSION

Dr. W. McKim Marriott, St. Louis, Mo.—It is really very gratifying, to see the teeth getting a square deal or, you might possibly say, a square meal.

We have been perfectly satisfied for such a long time to let the teeth do the work for the nutrition of the body. We have looked on them simply as tools that prepared the food for our precious bodies and never thought about giving the teeth anything to eat or considering the fact that their nutrition was also important.

There has been accumulated during recent years a very large amount of evidence to the effect that the development, the structure and the maintenance of the physiologic function of the teeth may be profoundly influenced by the character of the diet. This paper of Dr. Marshall's deals with one particular phase of that subject, namely, the relationship of vitamin A in the diet to the repair that takes place after orthodontic tooth movement. That is, of course, but one of the effects of vitamin A on the teeth.

We have to consider this whole subject of the relationship of nutrition to the teeth from several viewpoints. First of all, we must consider it from the standpoint of the structure and development of the teeth. That is influenced of course chiefly during the period of development. The proper structure of the teeth is determined, to some extent, before the child is born, to a very large extent during infancy and early childhood and somewhat during adult life.

We have to differentiate between those influences which alter the structure of the teeth and those which alter their subsequnt function.

First, as to the structure of the teeth. You are concerned particularly, as orthodontists, with the position of the teeth and with their movement by artificial means. If the structure of the teeth and attaching tissues is proper to begin with, that is going to facilitate the repair of trauma occasioned by movement. We have to consider not only the structure of the teeth, but also the structure of the alveolar processes, the vascular supply, and the cells lining the tooth socket.

It is fairly well recognized that those factors in the diet which chiefly influence the development of the teeth are vitamin D, which is the calcifying vitamin, a proper relation-

ship between calcium and phosphorus and, possibly to a lesser extent, the amount and character of the proteins in the diet. Those factors have to do with the development of the teeth in the first instance.

As the tooth develops and as bone develops the first stage is a laying down of osteoid or predentin. That tissue may be laid down even in the absence of vitamin D, but unless calcified it never turns into real tooth and bone. The function of vitamin D is to bring about the deposition of lime salts in this tissue which is still incompletely formed. Unless that vitamin is present, it makes no difference how much lime salts is fed to the individual, how much is present in the blood, or how much is brought there by the circulation, it will simply not deposit.

When vitamin D is present but the lime salts are deficient, there will be a decreased amount of lime deposition; it will, however, be laid down in a fairly orderly manner. The dentin which is formed and the bony tissue which is formed in the alveolar processes will be of very fine texture and easily fractured but not deformed.

What about deficiency of vitamin D in the diet and how often does it occur, and how may it be prevented? Deficiency of vitamin D may occur and influence the child during intrauterine life because of the fact that the mother's diet is deficient. During childhood, the child may get an insufficient amount of this vitamin if he takes too little milk and eggs or if he gets too little sunlight, or if vitamin D is not obtained from other sources.

In orthodontic tooth movement deposition of new tissue around the tooth or apposition will not occur satisfactorily if there is not sufficient vitamin D. There will occur instead an overgrowth of vascular tissue poorly calcified, and the tooth will be likely to remain somewhat loose in its socket.

Now turning to vitamin A, which Dr. Marshall has particularly discussed, this vitamin has been known as the anti-infective one. That is a rather poor designation for it. There is a great deal of question as to whether or not vitamin A in the diet increases resistance to infection or not, but we do know what it does to change the mucous membranes. When this vitamin is deficient there are changes in every mucous membrane of the body of which we know, the mucous membrane of the rhinopharynx, of the gastrointestinal tract, and of the urinary tract. There occurs a superficial keratinization of the mucous membrane, which renders that membrane extremely susceptible to infection.

This work which Dr. Marshall has presented goes to show that the effects of vitamin A deficiency not only are exhibited in the mucous membranes of the mouth and gums, but extend down well around into that invaginated portion of the mucous membrane which extends down toward the roots of the teeth. It is probably the changes in the mucous membrane itself which cause these changes in the effects of orthodontic appliances on the teeth of animals on deficient diets rather than any general bodily lack of resistance to infection.

Vitamin A has more to do with the nutrition and maintenance of the teeth and of the gums after they have been fully developed than it has with their development. Block of Copenhagen, who was one of the early workers in vitamin deficiencies, has recently reported on a large number of children who had suffered during early childhood from deficiency of vitamin A. They were blind because of changes in the mucous membrane of the eye resulting from vitamin A deficiency. He found that their teeth were of normal development and normal structure, that they suffered no more from caries than normal individuals, except in those cases in which there was also a history of associated vitamin D deficiency.

Vitamin A, according to the more recent work of the Mellanbys, seems to be a very important factor in preventing pyorrhea. The Mellanbys have shown that when vitamin A is deficient during early life in the diet these changes in the periodontal tissues are very likely, indeed, to occur in adults even if they have fully sufficient diets later. The time to give vitamin A is not later when trouble develops but very early as a preventive means. The proper time to give the adequate diet is long before the child is subjected to orthodontic procedures. The time to start it is before he is born and it should be continued through infancy.

Vitamin B and vitamin C are of very questionable importance from the standpoint of dental pathology. Vitamin B has never been linked up with dental pathology and vitamin C, the one that occurs in oranges and lemons, when deficient leads to changes in the small blood vessels and capillaries throughout the body, including those of the gums and dental pulp. But vitamin C deficiency is not a particularly important factor, in my opinion, in dental pathology as we see it in everyday work. With complete lack of vitamin C and with these vascular changes and hemorrhages in the dental pulp and elsewhere, of course there will be damage, but under ordinary circumstances it probably does not occur frequently.

The work of Dr. Marshall points to the importance of an adequate supply of vitamin A in the case of those who are to undergo orthodontic manipulations. Inasmuch as this is just one of the essential dietary factors, it is much better, until we find out more about the others, to see that all factors are supplied and in adequate amounts.

How many vitamin A do we need? Nobody knows, but we had better get enough. Too much will not do any harm. With vitamin D, on the other hand, too much may possibly do a little bit of harm; in fact, a very great excess can do a great deal of harm.

How can we be assured that a sufficient amount of these are supplied? First of all, during infancy and childhood, plenty of whole milk; second, plenty of eggs to supply both vitamins A and D. The part of the whole milk that supplies it is the cream. Therefore, cream and butter are especially valuable.

We can supply still more of vitamin D by exposure to sunlight. It is hardly worth considering the small amount of vitamin D we get from irradiated cereals. There is not enough to do any harm and not enough to do any particular good. The amount in irradiated cereals, however, might be sufficient to help do away with any deleterious effects of cereals. Mellanby demonstrated the presence of an "anti-vitamin" in cereals, which tends to do the opposite to the teeth that vitamin D does, and if the cereals are irradiated the effect of this may be neutralized.

Then the question comes: Shall we give additional vitamin D other than that contained in foods? We can give it in the form of viosterol which does contain a large amount of vitamin D, but in the enthusiasm for viosterol we are dosing our patients with vitamin D and forgetting all about the equally important vitamin A.

Dr. Marshall has emphasized the importance of vitamin A. If you are going to give D, why not give A along with it, in the form of the good old-fashioned cod liver oil? If they will not take the cod liver oil, there are excellent concentrates on the market which contain vitamins A and D and are palatable and quite as effective as cod liver oil. We use a preparation known as White's cod liver oil concentrate. Every mother, before her child is born and every child up to the age of eight or ten years of age should take either cod liver oil or cod liver oil concentrate daily and in adequate amounts.

For vitamin A there is one more very rich source that we should not neglect, and that is the lowly carrot. Carrots have more vitamin A in them than almost any other vegetable. It is associated with the yellow coloring matter in the carrot. There is also some in lettuce and in spinach. The moral is to give enough of these vitamins to be on the safe side. There is no need to bother much about the mineral salts. If children take a quart of milk daily they will get all the calcium and phosphate they need. It is never necessary to add extra phosphate, and only very rarely is it necessary to add extra calcium. Provide the vitamins by giving milk and the other foods mentioned, and forget about trying to kill off the germs in the mouth.

To try to get rid of the germs in the mouth by various mouth washes and antiseptics that kill so many million bacteria in so many seconds is much the same as the old way of trying to cure diphtheria by painting the throat with antiseptics. There is no way of disinfecting the mouth and keeping it that way for more than a few minutes. If you look after the diet, the cells in the mouth and the gums and even the teeth themselves will fairly well take care of any germs that are there.

I think Dr. Marshall is to be congratulated on the additional evidence he has brought forth on the importance of diet in relation to the teeth.

President Kelsey.—I think the Society is to be congratulated on meeting in St. Louis if for no other reason than to have had Dr. Marriott address us again.

The other discussor for this paper is Dr. Virgil Loeb of St. Louis, Missouri.

Dr. Virgil Loeb, St. Louis, Mo.—I dislike to start a discussion of a paper with an apology, and yet in this instance I feel that I am justified. I feel my absolute incompetency to discuss properly Dr. Marshall's able paper, since so few of us know a great deal about diet and its relation to dental pathology.

We have all been interested during the past few years in noting Dr. Marshall's various experiments and the work which he has been carrying on in his laboratory. It is indeed gratifying to know that we have men of his caliber who will attempt to solve some of the intricate problems relating to diet. What little I have to say is based upon practical observations made over a period of years. There are so many conditions which we meet in daily practice which are yet unexplained. For a while we felt that focal infection was the basis of most of our ills. Unfortunately, however, we have found that millions of innocent teeth have been removed for the correction of unexplained symptoms, simply because evidence of infection was noted at their apical ends. I do not believe it will be this way regarding diet, for the research worker in that field should be able to give us more definite information.

Many of us feel that we are on the threshold of a new era in dentistry, and the entire practice may be revolutionized if the suggestions which have already been brought out relative to diet continue to materialize as they have during the past few years. With the very definite part which we already feel that nutrition plays in the pathology of caries and pyorrhea, there should be less necessity in the future for restorative dentistry. Of course, much will depend upon the cooperation which patients themselves will give, but the fact that experience in the past shows lack of cooperation assures the dentist that his aid will still be necessary in correcting dental defects. The help of the physician is unquestionably necessary in order to bring about an understanding in the minds of the laity of the importance of diet and bodily health. Dr. Marriott referred to the fact that "a healthy tooth will not decay." There is much to this thought, and yet in an unhealthy mouth where there is a definite lack of oral hygiene, accumulations around the teeth, and débris collecting in the interspaces, even the healthy tooth may succumb.

We all see the evidence which Dr. Marshall has brought out in all of his discussions relative to the absorption of the apical ends of teeth. We have wondered just why this condition exists, and we are still wondering in some cases. The work which he is now doing partially explains this phenomenon, and yet we have all seen children in the same family each of whom has undergone orthodontic treatment of practically the same type where in one absorption of the apical ends of the teeth results and in another there is apparently no change. Is it stress? Is it the type of appliance? Is it malnutrition? Most probably, as Dr. Marshall has said, it is malnutrition plus stress, and not the type of appliance.

If caries is due to local conditions alone, we would expect to find much more than we do in patients undergoing orthodontic treatment. One of the great problems is keeping the mouths of these patients in an hygienic condition, and yet at the present time we do not find a very large percentage in which caries develops. No doubt diet even as it is practiced today has improved this materially.

As Dr. Marriott has suggested, the care of the teeth starts before the birth of the child. We formerly heard the expression, "For every child, a tooth." In other words, the mother was expected to lose a tooth or perhaps two during pregnancy. This theory has long since been exploded, because of the fact that women consult their physicians early in pregnancy and are advised relative to diet. Foods are suggested which contain those elements necessary not only to build up new bone tissue, but to sustain that of the mother.

Another unexplained condition which arises in orthodontic work is a tendency toward the loosening of the teeth in many of the cases where regulation is undertaken for the second time. We meet with those cases where orthodontic treatment has apparently been successful, only to find rotation of teeth developing after the removal of the appliance, and loosening of the teeth following the second treatment. Is it undue stress or is it malnutrition?

Comparatively few cases of devitalization are found at the present time in children. Formerly it was common to have children consult us with devitalized nerves in teeth undergoing orthodontic treatment. At the present time we find comparatively few.

There is one condition which we meet with sometimes in which perhaps heredity and not diet plays a part. I remember one case where the radiograms of a child undergoing orthodontic treatment showed definite absorption of the apical ends of the maxillary anterior teeth. On questioning the mother as to whether or not she had had any orthodontic work done as a child, she said she had not. Radiograms of her teeth, however, showed a condition similar to that of the child. Was the absorption at the apical ends of the child's teeth due to this hereditary factor or was it simply the result of stress or diet?

When I think of the illuminating discussion which Dr. Marriott has given and of the poor attempt I have made, I am reminded of a story which I heard last week which is somewhat apropos. I hope the intent of this story will not be misinterpreted because it was told by an artist about an artist. A couple of weeks ago, Carl Milles, the famous Swedish sculptor, was in St. Louis. I had the pleasure of meeting him on two or three occasions, and he told this story of Sigrid Undset, the famous Swedish writer, a woman weighing about three hundred pounds and who, a few years ago, received the Nobel prize in literature. She was much interested in an old artist who was very poor, and for whom she had bought a small home out in the country by a brook where he might spend his few remaining days. On visiting him one day, he said to her, "I have only a short time to live and there are two things which even as an artist I have never seen. One is a woman in the nude and the other is a locomotive." Having gratified many of his wishes, she pulled his bed up by the window, and there being a stream near by, she proceeded to go to it and disrobe and after disrobing, to bathe therein. When she came back into his room, he smiled and said, "Thank God, I have at least seen a locomotive."

So I feel, after my vain attempt to discuss this very able paper of Dr. Marshall, that you are saying, "Thank God, we were able to hear Dr. Marriott."

President Kelsey.—I am sure the Society is just as grateful to Dr. Loeb as it is to Dr. Marriott and feels itself equally benefited, and it has had the added advantage of having been very much entertained, too, as the clapping evidenced.

The next thing on the program is a case report, and besides that we have a paper and discussion, that are supposed to be through by four-thirty. That being the case, I don't think we will have time for any more discussion of Dr. Marshall's paper. I will therefore ask Dr. Marshall if he has any remarks to make in closing.

Dr. John A. Marshall.—I am greatly indebted to Dr. Marriott and Dr. Loeb for the discussion of my paper.

I am also indebted to Dr. Marriott for something else and I want to make this public acknowledgment. Yesterday when I came to scout around St. Louis for microscopes for my exhibit I found they were few and far between until I called Dr. Marriott. He said, "Of course, Dr. Marshall, you can have as many as you want," and he was as good as his word. So I want to take this opportunity of thanking Dr. Marriott and also the Department of Bacteriology of Washington University for the loan of thirty-five microscopes, which I am using in the exhibit.

CHILDREN'S DENTISTRY FROM AN ORTHODONTIST'S POINT OF VIEW*

(The Missing Link)

By R. C. Willett, D.M.D., Peoria, Ill.

UPON receipt of the invitation to take part in the program at this meeting of The American Society of Orthodontists, I replied to your chairman that I would speak on the subject of "The Missing Link." Afterthought suggested that under this title my subject would be difficult to classify in an index of either special or general literature, and that for publication or listing, the title of the paper should be more definitive. For these reasons and with the approval of the censors, the essay takes form under the heading, "Children's Dentistry From an Orthodontist's Point of View," leaving the applicability of its first title to your final consideration.

The word "chain" may properly be applied to anything that functions through closely connected units forming a structure. Now whether those component units are factors comprising a merchandising organization, or closely related specialties constituting a profession, the component units or specialties represent the links in a chain of constructive efficiency, and that this chain may be of greatest strength and usefulness there must be in it no weak or missing link, else the inevitable result will be impaired efficiency of the entire chain.

In the profession of dentistry and its specialties, the units are so closely related that the weakness of one will readily afford the etiology complicating action in the others, and we must realize that a situation of this kind exists at the present time between the practice of children's dentistry and that of orthodontia.

Neglect of defects in deciduous teeth and ineffective repair of them in the maintenance of function invariably lead to malocclusion. In the resolutions, "Principles Relating to Dental Health," formulated by Delabarre and endorsed by fifteen states, three national dental associations, and the Federation Dentaire Internationale, before being endorsed by The American Society of Orthodontists in 1927, occurs this statement:

"The orthodontist needs the complete cooperation of the dentist to insure and maintain dental health before and during orthodontic procedure," and Delabarre proceeds to list the preventive principles as follows:

Proper attention to initial defects,

Particular care and attention to all pits, fissures and grooves before caries appears,

No cavity should be considered too small to fill,

*Presented at the thirtieth annual meeting of the American Society of Orthodontists, St. Louis, Mo., April 21-24, 1931.

The deciduous teeth should have the same care and attention as the permanent ones, as their maintenance in health is essential to the proper development of adult occlusion.

The pronouncement of these principles is followed by his dynamic words "Disregard of these principles and practices of accepted dental teachings constitutes a transgression of professional obligation to the patient and a serious handicap to orthodontic procedure."

In an as yet unpublished essay by Charles R. Baker, he said: "I believe that the greater field of constructive work within the scope of the general practice of dentistry remains practically untouched; and that more important than the practice of orthodontia are the prevention and interception of malocclusion."

These quotations from authorities of such preeminent standing should call and hold our attention to the fact that there is much in the practice of children's dentistry that deeply concerns the orthodontist, and that because practice in this specialized line precedes and intermingles with that of orthodontia, lines of professional demarcation between the two cannot be definitely established. We have many problems in common, demanding from us mutual research and study, with final effective collaboration in action, to the end that missing or defective links in dental phases of health service shall occur less frequently.

These facts are justification for orthodontists, individually and collectively,

TABLE I

SUMMARY FROM AN EXAMINATION OF 1000 ORTHODONTIC CASE RECORDS (AGES: 17 MONTHS TO 10 YEARS)

	PER CENT
Caries of deciduous teeth and defective fillings	60.3
Premature loss of deciduous teeth. (Total number of deciduous teeth prematurely lost 893)	28.9
Caries, defective fillings, and premature loss of deciduous teeth the direct cause of malocclusion	8.4
Caries, defective fillings, and premature loss of deciduous teeth the contributing cause of malocclusion	52.5
Evident need of preschool dental attention	61.2

TABLE II

SUMMARY OF CASE RECORDS SHOWING RELATIVE COMPARISON OF FINDINGS

PER CENT BOYS			PER CENT GIRLS
60.5	Caries of deciduous teeth and defective fillings		60.1
29.6	Premature loss of deciduous teeth. (Total number of deciduous teeth lost: boys, 420; girls, 473)		28.3
11.6	Caries, defective fillings and premature loss of deciduous teeth, the direct cause of malocclusion		5.2
53.2	Caries, defective fillings, and premature loss of deciduous teeth the contributing cause of malocclusion		51.9
58.2	Evident need of preschool dental attention		64.2
	Boys	428	
	Girls	572	
	Total	1000	

to interest themselves in the progress that is being made by dentists in their efforts to solve the dental health problem of childhood.

From the records of my own practice which is principally made up of cases among the children of middle class people, and is, I believe, representative of the majority of orthodontic practices, I have made a close survey of one thousand child cases. This was done to determine definitely the relative number of them in which caries of the deciduous teeth and its later consequences actually contributed to the complications of malocclusion. The ages of these patients ranged from seventeen months to ten years.

Tables I and II record plain facts relative to caries of the deciduous teeth and show the percentage of cases in which such correctable defects contributed to the complication of orthodontic problems.

It is to be definitely understood that in making this survey only caries, defective fillings, and premature loss of deciduous teeth were considered.

How are the childhood dental problems being met by the dentist? Where is he failing in the maintenance of occlusion of the deciduous teeth? Can these questions be answered?

In preparation for the writing of this paper and with an earnest desire to gain a comprehensive knowledge of what has been and is being done in this most important line of dentistry, also to determine if possible the cause of so much ineffective service by the average dentist, I have reviewed much of the literature that has appeared in our leading dental publications during the last fifteen years.

In 1916, one of the state dental societies, ranking second in its membership, called upon a man of known interest in children's dentistry to write a paper on the treatment of children's teeth. From the standpoint of sentiment and in view of the fact that childhood dentistry was at that time sadly neglected and infrequently discussed, the paper was equal in many respects to some present-day articles on the subject, while the operative technic advocated was little more than a step behind.

Of especial interest to orthodontists is the point stressed by the writer in these words:

"There often arises in the treatment of children's teeth a seeming deficiency in development of the jaw. This is most often caused by the crowns of the teeth becoming broken down and the roots of the teeth closing together, finally forming a smaller arch. This trouble can sometimes be practically overcome by packing the proximal cavities that occur with pink base plate guttapercha. The constant chewing on this pack spreads the teeth apart, stimulates and increases growth of the alveolar process, giving sufficient room for the permanent teeth."

The writer adds "While on this matter of the development of the jaws, I must not fail to say that the average child does not exercise his teeth sufficiently."

This quotation and others that follow are not used in a spirit of ridicule, but to show that some serious thought was beginning to take form in regard to the relation of function to structure and growth, though the writer had little

conception of an efficient technic of application that would actually restore hygienic conditions and afford a comfortable means of chewing.

When published, this article had a nation-wide circulation, and there is no question but that, through its influence, an impression was made on the practice of children's dentistry, but it did nothing to strengthen that weak link in the chain of oral health maintenance.

Between that time and the year 1922, much doctrine of a similar nature found its way into print, but in it there was nothing of a really constructive nature. In the face of this dearth of informative literature on the subject, interest in children's dentistry was steadily growing, and the promotion of preventive measures in practice becoming a popular subject.

In 1922 a writer internationally known said in an exhaustive article on preventive dentistry: "In our enthusiasm over mouth hygiene, oral prophylaxis, and diet, many seem to have largely overlooked the preventive phases of operative dentistry. When the other measures, hygiene, prophylaxis, and diet, applied as best they may be, have failed in a given case—and we must admit that failure, to a greater or less extent, is the result in the mouths of a majority of children—then our principal reliance must be upon the best operative procedures for the saving of the teeth. These are generally known, but not well practiced.

"First comes the operative care of the deciduous teeth, neglected most of all. The most prominent feature of our failure is lack of watchfulness, for the operations necessary to save the deciduous teeth are very simple. Possibly 90 per cent of them may be accomplished by the use of nothing other than black copper cement. The important thing is to see children often, and to be thorough in what we do."

This writer, an author of standard dental works, whose opinion is widely accepted the world over, when he suggests that 90 per cent of the filling of deciduous teeth may be done by the use of black copper cement, evinces no appreciation of the necessity for maintaining function of the deciduous teeth and of oral health, beyond the mere stopping up of cavities. It may be true that black copper cement when properly manipulated will arrest the progress of caries, but it is no more dependable than any other plastic material, and it will in no case restore and maintain function. This article, from which I have just quoted, had an international distribution and was the means of again spreading unsound doctrine from an orthodontic point of view.

From 1922 to the present time there has been a noticeable increase in the volume of literature pertaining to children's dentistry, and writers on the subject have become numerous. In their articles they have said much about child physiology, means of securing and sustaining the child's interest, and the education of parents to the importance of the issue as a health measure. In recent published treatises and in addresses, more frequent reference is made to function of the deciduous teeth, and the belief is expressed that the filling of these teeth should be done in a way that will restore and maintain function. In no instance, however, has a definite technic, applicable to the making of such restorations, been suggested or devised that would meet the needs of this problem and sustain the ideals set forth in discussions of the subject.

The operators unanimously agree that amalgam, one of copper or silver, is the ideal filling for deciduous molars, and they make no exception as to the surfaces of the tooth involved. They do not seem to realize, or else they ignore, the character and distribution of the enamel and dentin of deciduous molars, and the fact that depth of cavity preparation and undercuts necessary for the retention of such plastic materials, not only endanger the pulp, but leave frail walls that as a rule will check, permitting leaks that invite recurrence of decay.

Contact points are difficult to establish in the making of proximal amalgam fillings, and faulty operation in this respect, combined with gingival margins that are usually left unfinished, opens the way for the retention of food packs, microorganism nests, and irritation of gingival tissues, yet these writers assure us that these fillings are placed "to preserve a comfortable masticating surface." Some of them have even suggested the bridging with amalgam from one proximal cavity to the opposing proximal cavity.

While it is my intention to speak in this paper only in general terms and to avoid individual attack, I feel compelled to refer directly to the work of M. Evangeline Jordon, *Operative Dentistry for Children.* In it the writer states her opinion that the gold inlay "is of doubtful value," and further asserts that "the inlay spreads under the stress of mastication."

It seems incredible that this writer does not know that there are hard gold alloys that will not spread under any "stress of mastication." From an orthodontic viewpoint, little appears in the operative technic advocated by Dr. Jordon that could be expected to reestablish and maintain function of the deciduous teeth, once they have become defective because of caries.

On page 86 of her book can be found an illustration (Fig. 78) of false premise and deduction. The author shows a radiogram and gives the following explanation of it in support of her methods of root canal treatment: "The pulp of a deciduous tooth is larger in proportion than in a permanent one. In this case the deciduous first molar had been devitalized three years previously, but illness had lowered the child's resistance, and an abscess had formed. As the child was still in poor health, the tooth was extracted."

Now, in view of what the radiogram disclosed, focal infection must have been active during the three years the tooth was retained. Judging only from the author's description, is it any wonder that the child became ill?

In the light of our present-day knowledge concerning secondary reactions resulting from dental foci, confirmed as such knowledge has been through the research work of Rosenow, Price, Box, and many others, this writer's doctrine and methods advocated for the treatment of deciduous teeth in cases where pulp involvement has occurred seem unpardonable.

In the work of Hogeboom, *Practical Pedodontia,* there is to be found nothing more acceptable in doctrine or practice, from an orthodontic standpoint, than in that of Jordon. It is an even break as to mistaken estimation of causes, their effects, and remedial or preventive methods.

In 1929 an essay was read before a Middle West dental society, in which was presented what the writer termed, "practical suggestions in children's dentistry." I will quote only two of them, as they are typical of the others. Rather amazing was this statement: "With the exception of a few very young

children it is not advisable to try to save a tooth for any length of time that is abscessed and has fistulous opening."

The paper advocated, however, the retention of the second deciduous molar when it has a fistula, this to remain until the first permanent molar erupts. The lamentable feature of the presentation of these suggestions relating to the retention or extraction of deciduous teeth involving so much pathology was that, in the discussion that followed, no particular objections were raised nor was any challenge given to the doctrines set forth.

If human life has a value distinct from, and superior to, all other things of created value, is it not our plain duty as orthodontists, upon whom fall the disastrous results of practices that beget, foster and complicate malocclusion, to do much more in assembly than offer resolutions? It is certain that the resolutions emanating from and endorsed by The American Society of Orthodontists have had a visibly pronounced effect upon childhood dentistry, and are a long stride in the right direction, but a great work remains to be done in broadcasting in lecture room and convention the results of laboratory and clinic experiments.

I should not feel justified in criticizing the doctrines and practices pertaining to children's dentistry herein referred to, had I done no more than to review literature on the subjects, and make an estimate from my own case records showing that neglected defects of the deciduous teeth directly and indirectly contributed to malocclusion.

The frequent complaints from parents that time had been uselessly spent in the repair of their children's teeth, and counter complaints from dentists that parents did not cooperate in what they attempted to do, impelled me to make a personal investigation of the matter. To acquire a more comprehensive knowledge and to aid in a much needed public health service work, children were selected through the orphanages and child welfare associations for clinical study.

For this work the most hopeless and undesirable types of children were chosen. This was done because we believed that if the contemplated operations could be successfully accomplished upon physically and mentally handicapped child patients, there would remain no justifiable excuse in private practice for the neglect of the normal child.

There was another object of equal or even greater interest in the contemplated work which was to demonstrate beyond further question whether or not function of the deciduous teeth, once partially or wholly lost, could be successfully restored to the extent that a renewed acceleration of growth of the dental arches would actually take place. Time will permit the showing of only three cases, but they demonstrate the character of the treatment accorded the selected group of children furnished us by the public health service.

Case I is that of a little girl aged five and one-half years.

This child was brought to our attention in December, 1929. She had suffered a general infection, and prior to the time when she was referred to us for the care of her teeth, there had been an unbroken fever over a period of months. She had a tubercular hip, the left leg having been in a cast for eighteen months, and this affliction was supposed to be the cause of the continuous run of fever.

The seat of focal infection that appeared to be most active in the mouth involved the mandibular right and left second deciduous molars, the first permanent molars not having as yet erupted. At the time of the first examination, pus was draining freely from the gingival tissue at the buccal and distal surfaces of the teeth involved. There were numerous cavities in other deciduous teeth that were productive of pain and discomfort in mastication.

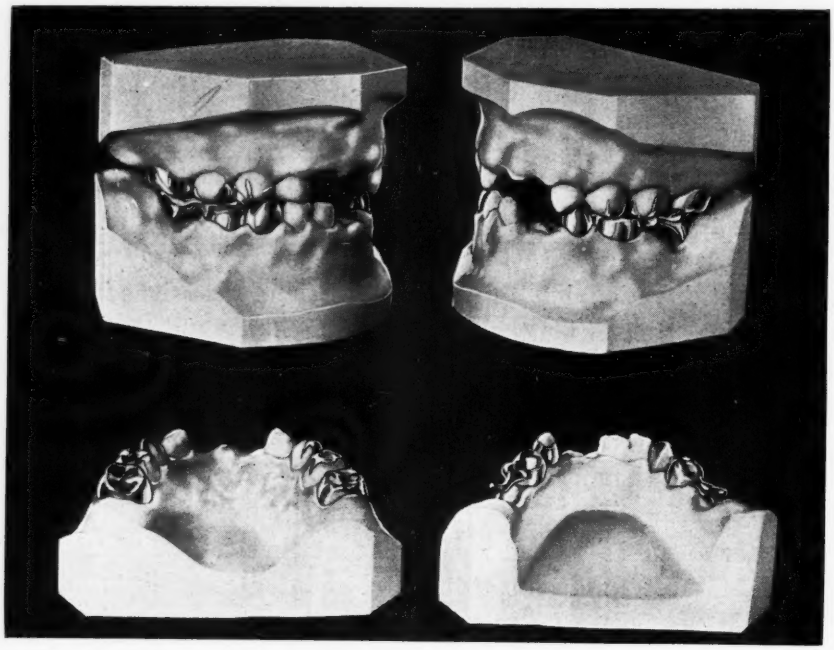


Fig. 1.

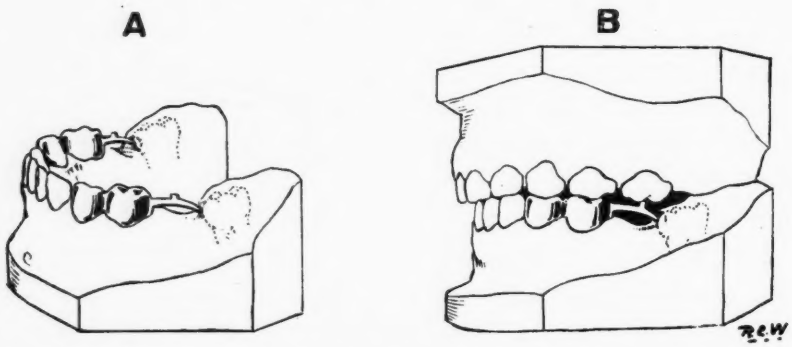


Fig. 2.—*A* and *B*, all cast one piece space maintainer, serving three distinct purposes: (1) preserving space for second premolar; (2) limited function restored in the affected area maintaining position of maxillary second deciduous molar; (3) guiding mandibular first permanent molar into position.

The Treatment.—The mandibular second deciduous molars were removed, and the tissues of the child's mouth were restored to health. This treatment was immediately followed by restoration of function of the teeth. (Fig. 1.) The restorations consisted of cast overlays for the maxillary second deciduous molars. Employing a special technic that we have devised for the making of inlay restorations for proximal defects of deciduous molars and canines, the maxillary first deciduous molars and canines were fully restored.

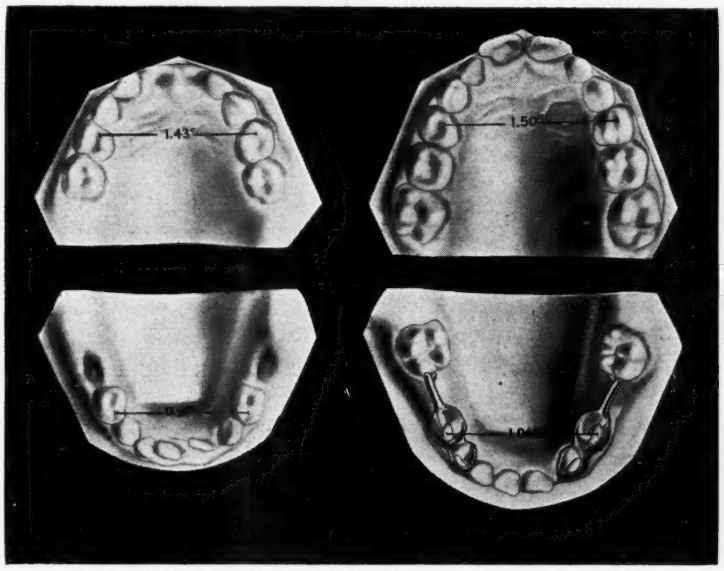


Fig. 3.—The width of the dental arches increased approximately 0.07" during the first ten months after restoration of function.

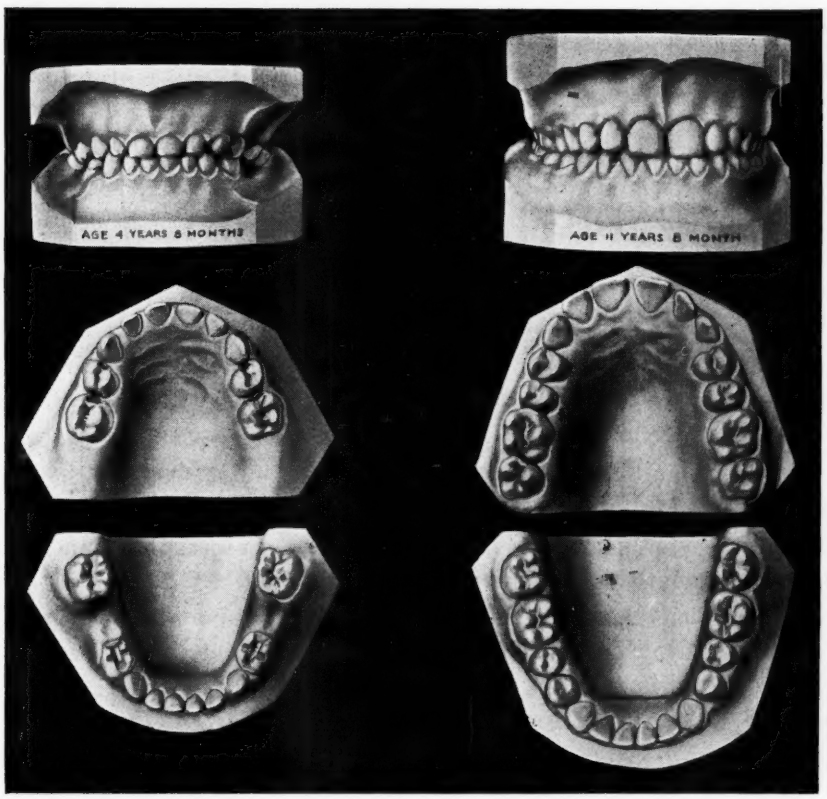


Fig. 4.—*D* casts were made after the removal of space maintainers that guided the eruption of the first permanent molars.

In this work of restoring function, maintaining space and controlling the eruption of the mandibular first permanent molars, the deciduous canines and first deciduous molars on the right and left sides served as bases of anchorage for functional space maintainers. In Fig. 2 is shown a theoretical illustration of the space maintainer's use.

During the treatment of this case the temperature became normal, and has so remained. Since there had been no response to previous treatment, it is only reasonable to claim that the clearing up of the dental focal infection was the main factor in bringing about the return to a normal temperature and the renewal of bodily growth.

In Fig. 3 is shown conclusive proof that a growth of the dental arches was promoted. A comparison of casts made in December, 1929, before function

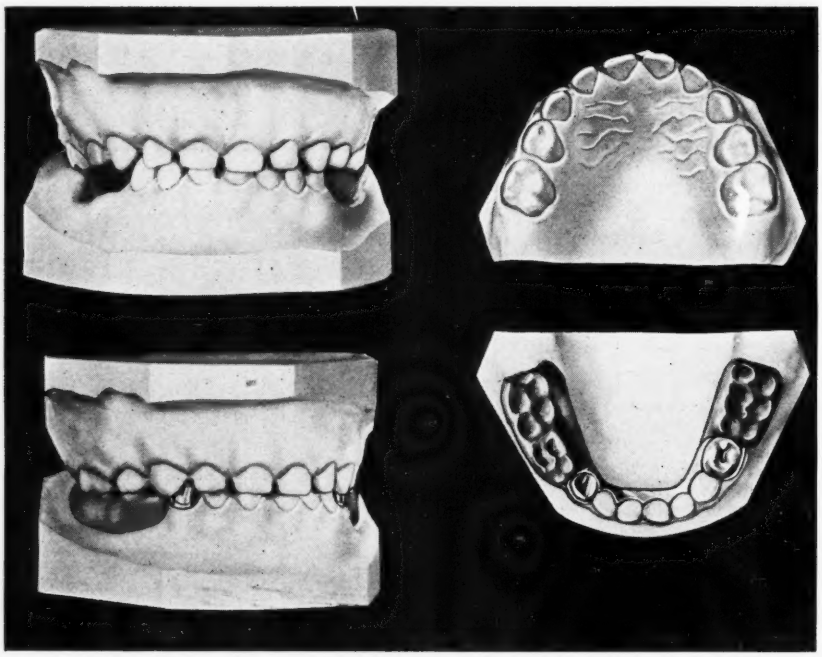


Fig. 5.—*A*, premature loss of mandibular deciduous molars; *B*, removable partial denture to restore function.

had been restored and those made ten months later, in October, 1930, reveals the fact that the dental arches had increased in width approximately 0.07″, and also that the one-piece cast space maintainers guided the mandibular first permanent molars into fairly normal position.

Advantage was taken of the eruption of the first permanent molars, and semifixed bar functional space maintainers now replace the type first used for control of the erupting molars.

Since the making of this illustration six months ago, the dental arches have continued to develop in the canine region. This steady growth will accommodate a more normal eruption of the lateral incisors, and now assures a lessened need of future orthodontic treatment.

Case II.—As a further clinical demonstration of what can be accomplished through the maintenance of function of the deciduous teeth, this case has

proved to be most interesting. (Fig. 4.) When the child was four years, eight months old, we found caries in all of the deciduous molars and canines. The mandibular second deciduous molars were broken down to the gum line; nothing was left but roots which were involved in much infection. The loss of tissue, because of the infection of these roots, had exposed the first permanent molars, and they were in a well advanced state of eruption.

Functional space maintainers, consisting of crowns for the first deciduous molars and canines with extension spurs that engaged the first permanent molars in a way similar to that shown in Case I, were securely placed. At that time we had not developed the cast overlay anchorage technic. Inlays and properly occluded thin gold crowns were placed to restore function of the maxillary deciduous molars and canines. This illustration also shows in Fig. 4 *C* and *E* the occlusion of the permanent teeth at the age of eleven years, and the result was attained without any other treatment than that here described.

CASE III.—While partial dentures can be practically applied in the maintenance of function and space in either arch, in our experience the mandibular first and second deciduous molars have proved to be most susceptible to caries terminating in a premature loss of those particular teeth. For patients ranging in ages from three to six years, we have supplied partial dentures many times, and in no case has there been a disappointment as to the manner in which the first permanent molars have erupted, while at the same time a general collapse of the dental arches has been prevented, Fig. 5.

CONCLUSION

Having demonstrated in practice the beneficial results from the different types of functional space maintenance devices that have been shown, the question arose, "Upon whom rests the responsibility for their application?"

It was to settle in my own mind the question as to who could and should apply in practice the means I had devised, that the interest of a group of progressive dentists was sought. Their enthusiasm and its results have been gratifying. They are proving beyond a doubt the truth of my contention that most of this work is the duty of the family dentist, rather than that of the orthodontist, and that function of the deciduous teeth can be maintained under almost any circumstances.

Satisfactory as this showing is, considering the comparatively short period of investigation and experiment, the field is so vast that the services of every family dentist are needed if children are to receive the care necessary to insure mouth hygiene and normal oral development. Through correspondence and personal interviews with many dentists interested in the childhood dental health problem, I have endeavored to obtain a consensus of opinion as to where the responsibility rests for the prevention and interception of malocclusion.

No similar question was presented in regard to the obligation of operative procedures in the making of efficient restorations for deciduous teeth, as this work is plainly the duty of the family dentist, and of those specializing in children's dentistry, but about the first there exists a wide difference of opinion, and until a definite answer is given and accepted this most important work

will continue to constitute the "missing link" in the practice and, from the standpoint of child service, the ethics of dentistry.

It is with the hope of inducing the personal interest of every dentist and orthodontist that I leave for your consideration and decision the practical answer to the searching question, "What is my professional obligation in this great humanitarian service of the prevention and interception of malocclusion of permanent teeth?"

DISCUSSION

Dr. O. W. Brandhorst.—Dr. Willett has just presented another one of his masterpieces. He has called attention to an existing condition and offered the remedy. Can we ask for more?

A number of years ago, when the question of prevention first began to present itself in dentistry, Peoria, Illinois, was among the first to tackle this problem. Those of us who know the history of this movement know that its success was due to the untiring work of a few, principally Drs. Smith, Whalen, and Willett.

Today, Peoria is foremost in pointing out the best methods of dental education in the public schools. The question of prevention in dentistry is no longer one of theory but of fact. It is quite fitting that the first step in orthodontic prevention should also be brought to us by one of Peoria's own citizens; as C. Carroll Smith's name is associated with all good things in preventive dentistry, so R. C. Willett's name is indelibly inscribed in prevention in orthodontia.

Those of us who have had the pleasure of seeing this human dynamo in action, meeting out service to right and left, and offering the spark that has started many of us in the same direction, marvel at the accomplishments of this man, and salute him as truly worthy of that great ideal, "Service above self. He profits most who serves best."

All of us know that it is not all well in that expanse between dentistry and orthodontics. Only within the last few years has the interest in children's dentistry asserted itself. Certainly, if there is a weak link in our health service, it is children's dentistry. Who is to blame for this? On the face of it, it would seem that the major responsibility would be that of the family dentist. It is true that in the final analysis, it will be he who must execute the operations that are to be suggested.

But let us not lose sight of the fact that as a group which is most vitally interested in the growth and development of the child, as orthodontists, we also have a responsibility in working side by side with the family dentist, in applying preventive measures.

As Dr. Willett says, "We have many problems in common, demanding from us mutual research and study, with final effective collaboration in action, to the end that missing or defective links in dental phases of health service shall occur less frequently."

We all know what the outcome will be if the deciduous teeth are neglected, and it is our duty to advise and cooperate with the family dentist to overcome these ill effects.

It is not enough to apply corrective measures in the cases of oral deformities. We must also institute preventive measures. Our health service is not a real health service until we can successfully offer some prevention. Dr. Willett's tabulation shows that 60 per cent of the causative factors could have been controlled. Think what it would mean to humanity if we could through advice and proper precaution eliminate the majority of the cases we now treat, and as a result of it, be able to serve many more.

The very nature of orthodontic treatment precludes the possibility of the orthodontist, through corrective means, ever reaching more than a very small percentage of those needing treatment. Think of the greater service and possibilities in prevention. Here is real opportunity. Are we, as orthodontists, going to be indifferent in the matter and pass on the responsibility to the family dentist, or shall we cooperate and do our part? The family dentist needs our advice and counsel, as well as our moral support.

Dr. Willett suggests that the question of proper attention of deciduous teeth is essentially that of the family dentist. But, relatively few family dentists place a sufficient

value upon the deciduous teeth to care for them properly. Then again, when they are interested and turn to present textbooks for suggestions, what do they find?

Until this situation is changed, we, as orthodontists, must advise the family dentist as to ways and means. We must take him under our wing, or accept our share of the blame for existing conditions.

Delabarre's principles of "Prevention," as enumerated by the essayist, will bear repeating. Namely:

"1. Proper attention to initial defects.

"2. Particular care and attention to all pits, fissures, and grooves before caries appears.

"3. No cavity should be considered too small to fill.

"4. The deciduous teeth should have the same care and attention as the permanent ones, as their maintenance in health is essential to the proper development of adult occlusion."

And then the warning, "Disregard of these principles and practices of accepted dental teachings constitutes a transgression of professional obligation to the patient, and a serious handicap to orthodontic procedure."

Dr. Willett's suggestions are sound. Those of us who have tried them have found them to be most helpful and efficient. They embody the simplest means, with the maximum efficiency, based upon sound biologic principles.

Fillings placed in teeth should restore the anatomic form of the teeth. This is especially true of the mediodistal diameter. The function of the deciduous arch must be maintained.

Space maintainers should be so constructed as to maintain the space efficiently, and yet allow a sufficient freedom of movement in the teeth to permit normal function and growth. All of these requirements and many others are fully cared for in the methods suggested by Dr. Willett.

The attachments are essentially a product of casting. Inasmuch as all dentists do casting, the cast-overlay technic should especially appeal to them, for it does not involve a substantial outlay for new equipment to apply these methods. Economically, the proper care of children's teeth, including space maintaining, offers one of the very best means for building a practice.

The slides shown by Dr. Willett, show some of the appliances in place, and are self-explanatory. They offer much food for thought.

If you wish to be a potent factor in health service, practice prevention; if you would practice orthodontic prevention, share the responsibility of the family dentist; if you would extend your usefulness to humanity, interest yourself in ways and means for greater service to children.

Dr. Willett closes by asking, "What is my professional obligation in this great humanitarian service of the prevention and interception of malocclusion of permanent teeth?"

May I venture this answer, "My professional obligation in this great cause of prevention is to give freely of my time to acquaint the family dentist with the facts and to help him with his problems, so that more and more children may come under the influence of our beneficent art."

Dr. Raymond L. Webster, D.M.D., Providence, R. I.—While viewing for the first time, a few weeks ago, the recently completed Empire State Building in New York City, the tallest skyscraper in the world, I marveled at the strength that its framework must have. And then it occurred to me that all the details of construction for such a marvelous example of architecture had evolved from many years of carefully adding link to link before such a result as the one I was looking upon was accomplished. And so I think that the title of the essay which has been so ably presented to us this morning was most appropriately chosen, for during the past quarter of a century or more, has not orthodontia been building link by link or step by step on a foundation which was laid by its parent, dentistry? And now we are shown that a weak girder in our steel framework, which is tied right into its foundation, has been discovered, and our cry should be not only, how could it have been

overlooked? but more important still, how can it be strengthened to carry the load and assure us of the perfect structure which both the practitioner of general dentistry as well as the orthodontist is endeavoring to build?

Has it not been astounding to be shown that out of one thousand orthodontic patients 60 per cent had caries of the deciduous teeth and defective fillings, 29 per cent had premature loss of deciduous teeth, and of all these, 60 per cent were direct or contributing causes of malocclusion? And now that we know this, is it not our duty to carry this message to the general practitioner so that we may work hand in hand with him for better dentistry for children and the prevention of much malocclusion?

Since receiving a copy of this paper some time ago, along with the beautiful illustrations which are so characteristic of the work of the essayist, I have read it, reread it, had it with my meals and dreamed about it, and to discuss it from a constructive standpoint rather than just to repeat for emphasis what has been said, seems to me to be what could be termed in slang "a big order." I have endeavored, nevertheless, to the best of my ability, to boil it down so that we may discuss it under two headings.

First, has the orthodontist as well as the general practitioner appreciated the importance of the restoration of deciduous teeth in their relation to *function* and *structure?*

Second, to quote from the essayist's concluding remarks, "whose duty is it to make and place the different types of functional space maintenance devices" as shown in the paper?

Considering the first heading, when we ask ourselves if we have appreciated the importance of the restoration of deciduous teeth as related to function and structure, our first answer would be strongly in the affirmative. But have we not urged that the normal mesiodistal diameter of the deciduous molars be maintained mostly to prevent drifting and closing of spaces which would require orthodontic treatment later? If by closely following a case in which a deciduous molar had been prematurely lost, we saw no evidence of drifting, would we not be tempted to let it go rather than realize that through lack of stimulation in this area an arrested bone development might be resulting? Certainly the general practitioner could not be expected to appreciate such a condition if we do not give it enough importance ourselves, let alone bring it to his attention. Also in urging that restoration of all buccal teeth be so shaped that the proper cusp relationship be restored, do we think as far beyond this as to the effect upon normal growth that such a stimulation would have, or are we not just viewing it from a retentive standpoint?

We have all witnessed the broken down walls and loose silicate or amalgam fillings in deciduous teeth; and when such was the case have we not been hesitant about referring the child back to the dentist, knowing from experience what he would probably say about the impossibility of placing any further restorations for fear of its encroachment upon the pulp, if proper retention were attempted?

We see these things every day, and can we blame the parents for questioning whether or not such work on the deciduous teeth is worth while? To date I have seen only one patient where a gold inlay had been employed for the restoration in a deciduous tooth, and I might say that this parent had just come from the city of New York.

The economic side might no doubt prompt some dentists to refrain from the use of gold in deciduous teeth, but if the parents knew the relative restorative value of these two materials, would there be any question as to what should be used, and would parents not be willing and glad to go to more expense in the care of the deciduous teeth, if shown that malocclusion later might thereby be prevented?

I feel that through the lack of literature on this subject, the average general practitioner has never been acquainted with the possibility of gold inlay as approximal restorations in deciduous teeth, and that when called to his attention it would be most acceptable to him in solving one of his most trying problems both as to cavity preparation for young children and as to a permanent restoration for the life of the deciduous tooth.

As to the second heading to be discussed, namely, the question of whose duty it should be in the placing of space maintainers, as shown by the essayist, are there not instances in which the children's specialist could assume this duty, and on the other hand, are there not cases where it should be wholly assumed by the orthodontist?

The first instance, I should think, would be in types showing evidence of normal development, but having just lost one or more of the deciduous molars prematurely. In such cases the direct help of the orthodontist might never be necessary, and we all know how reluctant some parents are in being referred around by the dentist. In localities where there are no specialists in children's dentistry this duty might be equally well assumed by the general practitioner, if (as in the case of the children's specialist) he is sufficiently interested to be conversant in all of its attendant phases.

Dr. Willett states that he has been able to interest a group of progressive dentists in this procedure and that their enthusiasm and results have been very gratifying. He also recently wrote me that hardly a day passes that he does not receive a letter from some dentist in a remote part of the country asking about the making of space maintainers and other means of maintaining function of the deciduous teeth. As he notes in his paper, a great deal of work remains to be done by us in the lecture room and convention, and I feel we should all certainly be prepared and willing to assume this duty.

So much for the types to be treated by the dentist.

There are also types requiring space maintainers, however, which I feel should come wholly within the jurisdiction of the orthodontist. These would include the so-called borderline cases as related to lack of general development, as they require the closest observation by the orthodontist, and then of course there are the progressive cases in which space maintainers would only be the first step in an appliance treatment. Such should not be referred back to the children's specialist or general practitioner for the placing of space maintainers, for it would be asking the dentist to assume the rôle of laboratory man.

While this may, therefore, give us a somewhat definite line of demarcation, relative to who should assume the duty in the procedure under discussion, we must certainly agree with the essayist that there is much to bring about a difference of opinion on this question, and until it is definitely settled there will be occasion for a missing link in the steel framework which we are endeavoring to build.

ENVIRONMENT, HEREDITY AND MALOCCLUSION*

By S. Wilson Charles, L.D.S., R.C.S., England

THE object of this paper is to arouse interest in a form of investigation which is an earnest need of many students. Those who are interested in the study of bird life will have noticed a very definite change of thought during the last few years. It might almost be said to be a revolt of the younger generation against the tyranny of the older. Some writers even have stated this in definite terms; but, whatever the facts of the change, it is taking place. It is apparent to all real students that very little is known about birds, or for that matter about the other inhabitants of the wild.

There is hardly a textbook on natural history, from the viewpoint of wild life, which does not abound in mistakes. There are many reasons for this, the chief of which is that the subject is vast and the writer, having only a limited experience, has perforce to copy from other books or listen to the tales of others, who in turn have got their tales from somebody else.

It is hoped that by the cultivation of the true spirit of observation among thousands of people certain definite facts may be noted, so that in the years to come a fuller understanding of the real life of wild things may lead of itself to the solution of such problems as migration or nest building. It is this spirit of patient learning which is going to be the great force in natural history, and it is the learning of simple folks and their experience which will solve many of the great problems of life.

It does not require very much experience to realize that very little is really known about the facts of the evolution of the present types of living animals as we know them. Scientists differ in their interpretations of things which are often of a purely theoretical nature themselves. There is an old Chinese proverb, "When two men quarrel about the price of an onion, who shall say what happened in the time of Yu?" When half a dozen scientists quarrel about the significance of a fossilized bone, who shall say what the specimen really looked like in the beginning? The theories of evolution as relating to Man are today accepted as a fact by many scientists, though there are many who do not accept them with the whole-hearted assurance of a few years ago.

A letter from Mr. J. T. Cunningham appeared in the *Daily Telegraph* in answer to a letter stating that the facts of evolution were not proved. Mr. Cunningham first refers to the assertion that "There is no evidence in favor of evolution that an expert lawyer, properly briefed, could not tear to shreds with the utmost ease," and he said that that was probably true, but that what an expert lawyer could do, when sufficiently paid, was not a test of truth. He went on: "Scientific evidence is very different from legal evidence. The

*Transactions of British Society for the Study of Orthodontics.

evidence which proves the truth of evolution can be stated very briefly. First, there is no evidence that animals or plants as individuals ever arise except as the offspring of preexisting individuals. Life may have originated in the first instance on this planet from nonliving matter, but no satisfactory evidence of one of the higher forms of animals or plants arising otherwise than by reproduction from parents has even been produced. There is no evidence in the case of man or any other animal of complex structure that the succession of generations has ever been interrupted since the beginning of life. Second, the kinds of animals and plants existing at the present time have not always existed. The evidence of the fossil remains in the rocks show that in earlier ages the forms of the present time did not exist, but the remains of quite different forms have been preserved. There were periods when man did not exist, earlier periods when there were reptiles but no mammals, still earlier periods when there were no reptiles or mammals, but only fishes, still earlier when there were no vertebrates but only lower animals. Existing animals must be the descendants of the animals of former times, and all the scientific evidence shows that these ancient animals were different from those now existing. Therefore there must have been change in the course of generations, which is what is meant by evolution. To say that there is no evidence that man has evolved from a lower to a higher form is not correct. There is evidence from the study of fossils that the earliest mammals were evolved from reptiles, and no remains of man have yet been found in the periods when these transitional forms existed, or at any earlier period.''

I cannot help feeling that the writer of the original letter has a very strong case, for Mr. Cunningham's letter defeats its own object. He says, for example, ''no remains of man have yet been found.'' How can he be positive that they will not be found? I am quite sure that they may be. He goes on to say, ''Biologists, therefore, conclude that man originated by evolution from primitive mammals,'' and he says this is the conclusion from scientific evidence. The man who believes dogmatically in evolution as being a fact on the present evidence, however, is in a very weak position.

The theory of evolution has, of course, fixed itself firmly in the minds of all who are interested in the study of living things, even among those who are inclined to disbelieve it. The modern horse has one toe; the supposed original horse had three. The original horse lived in a forest, but when he came on to hard ground it is said that, being handicapped by his three toes, he changed them in process of time into one. I cannot understand the explanation about the hard ground, for the modern zebra, which I take it has some relation to the horse, has one toe, but spends all his time running about with two-toed antelopes and gazelles. Why should the zebra have one toe and the antelopes two, living as they do under the same conditions? There must be an explanation, but it is not the hard ground.

We know very little about the lives of animals, though with the modern tendency of sportsmen to hunt with the camera instead of the gun more is being learned. It is a pity that those who really know something about these animals should be the ones whom it is most difficult to induce to relate their experiences, for most of the camera studies one sees are by people who

do it for money and not as a scientific pursuit. Africa is still the dark continent, though it is fashionable to say there is very little left to explore. Most people walk over the unexplored parts without knowing anything about them.

The ways of elephants are past understanding. There is a herd of elephants living somewhere in southern Sudan which on practically the same day every year crosses the Msindi road going south. Nobody knows why these elephants go south and nobody knows what they do when they get south, but the extraordinary thing is that on a certain day every year they move south.

The tsetse fly which produces horse sickness exists in certain belts. I have lived in those belts, and if you go through them in a car both you and the car are covered with them, but when you go twenty yards or so beyond the border they disappear. The same thing occurs with the tsetse fly which causes sleeping sickness.

When we come to the accepted facts of heredity, there still seems to be great difference of opinion. In the latest book I am astonished to find that the Shetland pony is an achondroplastic dwarf. Perhaps I should have known this. But I really cannot accept the assertion that the St. Bernard, the Great Dane and others are acromegalic. Is the modern Airedale acromegalic because he is half as big again as he was twenty-five years ago?

There is, moreover, a great divergence of opinion about observed facts which makes things even more difficult. Take the case of toes in the human being. Arbuthnot Lane and others state that the second toe is normally longer than the big toe; on the other hand, Gates, in his book on Heredity states that the big toe is normally longer. As for the influence of environment, who shall say what happens?

During the last few years we have heard much about the native of Africa. We have been told of the advantages of primitive life and how it brings health in its train; we have been advised to seek the sun, the giver of life and the cure of all ills. It has been asserted so often that the native of Africa should set the pattern on which we in England should live that we are almost beginning to believe that it is true. It is said that the diseases of civilization are practically nonexistent among primitive tribes, some writers claiming that this is due to the fact that natives are never constipated. It is said that the teeth and jaws of natives are well formed when they live in their primitive state, and that when they adopt the habits of the white man their teeth become carious. I should like to see some definite work done on this subject, for it is my experience that among many primitive tribes caries and malformed jaws are more common than is usually supposed, and that there must be some other factor besides civilized food to account for the fact—if it is a fact—that primitive natives with supposedly good teeth develop caries on coming in contact with civilization.

Personally, I should say that there is a great deal of disease among primitive tribes. On the east coast of Africa you see every disease under the sun. The sun is a hard taskmaster, killing as often as curing when taken in the doses of Central Africa. One of the early arrivals in Unuyoro, which

lies between the Sudan and Uganda, said that the infant mortality was 90 per cent. I believe this was in 1882. Lately, I saw a report on the native question in South Africa, and it was there stated that the result of investigations showed that among the natives in South Africa the infant mortality was 700 per 1,000, which is 70 per cent. There is no doubt that whole nations have been swept out of existence by disease within our time, and today syphilis decimates large tribes to an extent undreamed of in England.

The truth of the matter is that very little is known about life generally; the subject is so vast that it is difficult to correlate all the facts that have been collected, and it is difficult to resist the temptation to fill in gaps in our knowledge from unreliable sources. As an example of what I mean, there is practically no limit to the credulity of the general public and scientists; on the other hand, if they are not to be gulled they are equally obstinate. It is very common for a Cook to discover a North Pole. You would be astonished at the number of famous people who claimed to have climbed Kilam'njaro, and yet, when in 1849, Kraft said there was snow on Mount Kenia, a mountain on the equator, the scientists of the world laughed him to scorn. It was not until Joseph Thompson went through Masai Land about 1885 that that statement, made thirty-five years before, was accepted. Yet Mr. Cunningham says when new evidence is discovered it will be accepted. I hope it will; but I am doubtful, for scientists are the most obstinate of men.

In his presidential address in 1925, Mr. Harold Chapman spoke of the possible influence of Murk Jansen's theory of feebleness of growth on the developing jaws and the production of malocclusion. In 1926 I read a paper on somewhat similar lines. I was at that time a more confirmed believer in feebleness of growth than I am now, not because I think it is wrong, but because it is so difficult to obtain any definite proof of it.

One of the families to which I wish to refer consisted of seven living members who had been brought up under the most poverty-stricken conditions, but in the country. The jaws of the four younger members were beautifully developed and comparatively free from caries. The three elder children are all married and have children of their own, but unfortunately neither of the parents of the seven has any teeth left. The child of the eldest girl, who always appeared to me to be a poor thing, is a seven months' twin with a cleft palate. According to some theories, cleft palate is inherited, but I cannot find any history of cleft palate. The other twin died at birth. This one was given up also, but after a long period of uncertainty my wife persuaded the mother to feed the child on dried milk, and the child has done wonderfully ever since.

The next family of which I am able to make a fairly complete history is one of four children. I am sure the only thing to do is to collect the evidence which comes our way and to wait until the next generation have children. It is almost impossible to obtain casts of unmutilated mouths in the grandparents of our present families; it is very difficult to obtain unmutilated mouths in the parents. It appears to me that the only way out of the difficulty is to take modern parents and their children and to wait until those

children have offspring of their own. It requires patience and determination, but it can be done, and it is a pity we did not think of it years ago.

The paternal grandfather in this case was normal, but the paternal grandmother was doubtful owing to early mutilation and neglect—I mean neglect from the point of view that people sixty years ago did not bother so much about teeth. I am inclined to think, however, that there was probably some slight abnormality or irregularity, but this was probably acquired. There is no evidence about the maternal grandfather, though he certainly had a history of a canine tooth in the roof of his mouth. The maternal grandmother had normal occlusion, though the bite was edge to edge. Her teeth were retained nearly all her life, for she lost the greater number of them at about sixty-eight. There is thus little evidence to be got from them, unless edentulous models give any information.

The father's mouth was normal, with a slight overbite. The mother's bite was apparently normal, though there was an early history of malocclusion. The two centrals were separated with the canines high up. The two centrals were pulled together, I regret to say, with elastic bands; the result, however, was remarkably successful, and apparently the canines came into position. Two paternal brothers and one maternal brother all had normal mouths, though one brother in each family had very hypoplastic teeth. The family in question is interesting. The ages of the children now are seventeen, fifteen, nine and two years, and all of the children are girls. I shall refer to them as A, B, C and D.

Child A was above the average height and weight and had the general characteristics of the maternal grandmother. She weighed 6 lb. at birth and was a poor feeder. The pregnancy before she was born was not particularly good; that is to say, the mother was not particularly happy. The child suffered from glands in the neck at the age of three, but these disappeared after a visit to Margate.

Child B was also over the average height and weight and had the general characteristics of the maternal grandfather. She weighed 5½ lb. at birth, but was a poor feeder. The pregnancy in this case was good. She suffered from a condition which we now know as acidosis, but which was originally thought of as biliousness or migraine. The child had measles at the age of twelve and tonsils and adenoid trouble between the ages of eight and nine.

The third child, C, was also over average height and weight and had the general characteristics of the maternal grandmother. She weighed 8 lb. at birth. The pregnancy was good. She was bottle-fed and a very good feeder; she was especially fond of raw meat. She had measles at the age of six, and tonsils and adenoids were removed at the age of five. She had the largest tonsils I have ever seen.

Child D was born prematurely, at just over eight months. It was a breach presentation and it was with the very greatest difficulty that the child was kept alive. The pregnancy was extremely bad from beginning to end, though whether that was due to the fact of a breach presentation or not the various doctors who saw her could not determine. For the early part of her life she was a breast-fed baby. For the first few months the life of this child

hung "on a thread." It was very difficult for her to keep any food down; her entire digestive system was out of order. The child was a vegetarian feeder. At the age of nine months she was taken to live on a farm. She lived in a tent and was fed on the milk of a special cow, and from that time she has thrived. Now at the age of just over two she does not walk, but it is a little difficult to determine whether it is that she cannot walk or will not walk. She has been known to walk, but the nurse was so astonished that she gave a loud yell and the child dropped on the floor. She can cross the floor at a remarkable pace, and I have seen her in a field going across the field in the same way and surrounded by large numbers of turkeys and little pigs. She thrives in the open air and immediately relapses when brought inside.

I should mention that as far as the other characteristics which may be said to be hereditary are concerned, the paternal family have all suffered from an affection of one eye. I suppose short-sightedness is about the best word for it, but various eminent oculists strongly recommended not wearing glasses for this condition. The paternal grandmother had it and the three sons of the paternal grandmother. In the case of child A, this affection is in the left eye and the child is left-handed. The left-handedness is apparently from two sides of the family. B has apparently normal eyes. C is ambidextrous and has short-sightedness in the right eye. It is, of course, impossible to say with a child of two, child D, whether there is any trouble of this kind.

When we come to the mouths of these children we find that child A has no laterals and no third molars; child B has third molars as in the case of the father; that is to say, two mandibular third molars, the maxillary right third molar absent, and the maxillary left third molar simply a peg of quite characteristic shape. Child D suffered from marked mandibular retrusion at birth. I have been unable to obtain any models, but I have an x-ray photograph showing the condition. Her teeth are now showing maxillary protrusion, but her first molars, which are the only molars present, are apparently in normal occlusion.

[Mr. Charles here exhibited three slides illustrating the dental condition of the first family. All have beautifully developed arches and perfect occlusion, and yet they have come from a most miserable home. Mr. Charles showed slides illustrating the dental condition of the second family.]

With reference to the child A, who had no maxillary laterals and no third molars—the point I wish your opinion about is this: On the left I show the mouth as it was four years ago, while the one on the right was taken during the last holidays. In my opinion the condition is infinitely worse than it was four years ago. Four years ago I was advised to leave the matter alone, but I am not sure I did the right thing in doing so.

These models were taken from the child B and are better articulated together because I think her mandibular molars are in what is called a buccal occlusion. She was a very pronounced thumb-sucker from a very early age, and she apparently went on sucking her thumb until she went to school at the age of twelve, but she did it at night when she was quite unconscious that she was doing it.

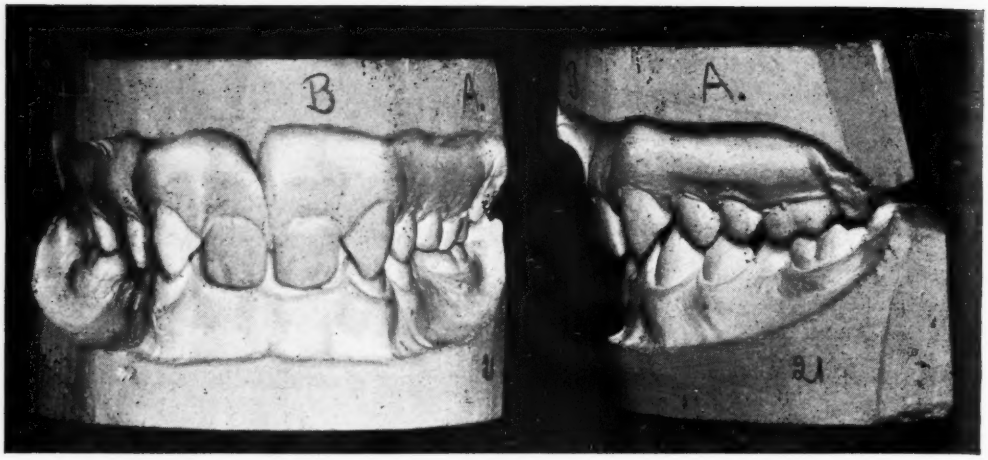


Fig. 1.—Child A.

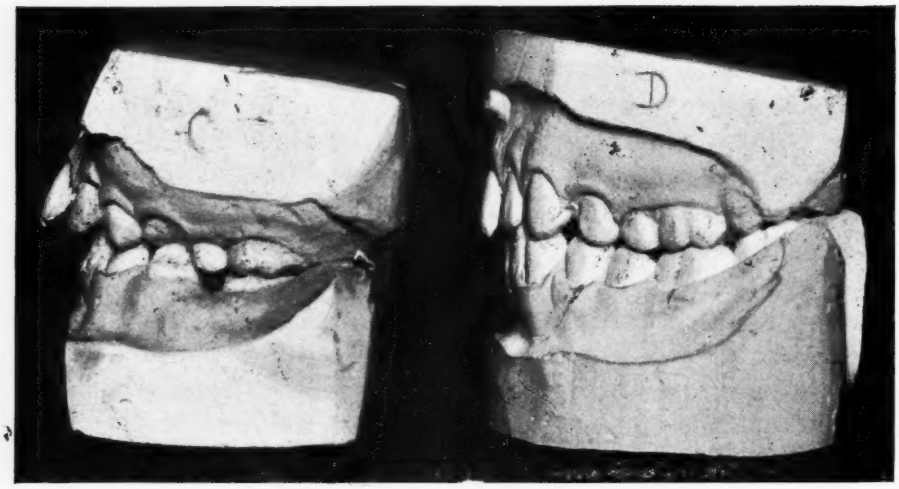


Fig. 2.—Child B.

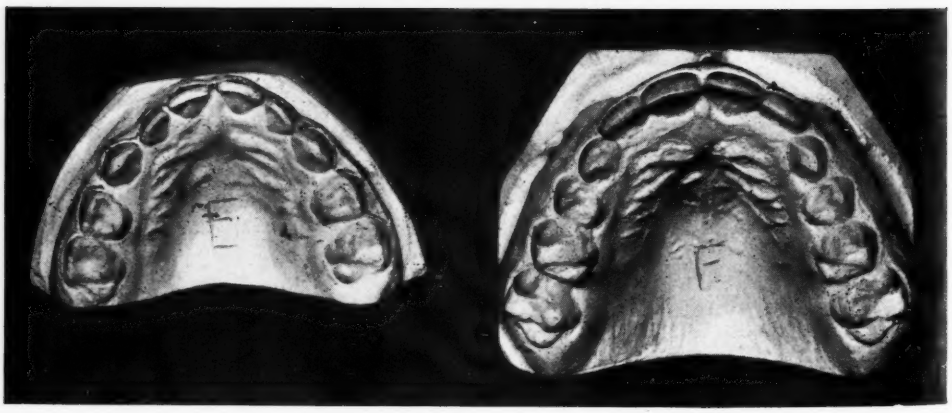


Fig. 3.—Child C.

This is the same child taken some years afterward. The first mandibular premolar is behind the first maxillary premolar. I am of opinion that her thumb-sucking pushed back her mandibular teeth on that side. The molars there are apparently in normal occlusion.

These models were taken some two years ago. You will see that the mandibular premolar that was missing before has come into position. This is the child who has two mandibular third molars, the maxillary right third molar missing and the maxillary left as I have already described it.

This is the child's model today. She stopped thumb-sucking as I have said, at the age of twelve.

If you will examine the models, you will see what a marvelous change has taken place in the mouth.

This is child C. The top model was taken at age eighteen months, and you will see there was quite a V-shaped arch. It is practically the same in the next. She was then persuaded to stop thumb-sucking, and the slide shows also her arch at the present day. As soon as she gave up her thumb-sucking she lost the V-shaped arch.

This shows an x-ray of the eldest child and shows the extraordinary development of chin which she has.

Here you have a family who have in the case of the first child remarkably irregular teeth due to the fact that some are missing; and in the case of the next child, if you look at the models, you will see a most remarkable change has taken place without any treatment at all. Child C undoubtedly had a V-shaped arch, and when the cause of that, thumb sucking, was removed, it returned to normal. D has marked mandibular retrusion at birth which, unfortunately, I cannot show you, but apparently her mouth is now getting normal as her health improves.

The relative positions of heredity and environment in growth are still the subject of considerable difference of opinion, principally, I think, because so very little is known about them. I think from my own observations that environment plays a small part in comparison with heredity, but this is only a personal opinion which I am trying to forget, because I am convinced that for the next few years we should all make a determined effort to learn everything we can about the simplest growth changes, and later perhaps we shall be able to grasp the significance of our collected knowledge.

DISCUSSION

The *President* said Mr. Wilson Charles had given a very thoughtful paper, and personally he was very much interested in some of the illustrations with regard to the question of heredity. A short time ago a case was brought to his notice of webbed feet persisting through three generations; the skin grew between the second and third toes in both feet in the three generations of the same family. Perhaps Mr. Wilson Charles might be able to explain another thing he had observed and for which he had never found any real reason, namely, as to why it was that some children just before they were able to walk moved about the room, some crawling on their hands, feet and knees, and others propelling themselves about on their little bottoms by sitting down and using their heels and hands. It was a minor point, but he thought it was of some interest. He noticed Mr. Wilson Charles ranked the influence of heredity much higher than that of environment as a cause of malocclusion, and showed cases where, when the cause of malocclusion was removed, the condition

almost returned to normal. One knew, however, that cases of malocclusion occurred which could be proved to be largely influenced by heredity, and in such cases at any rate, after orthodontic treatment of the malocclusion the irregularities and deformities did not return.

Mr. Bragg asked Mr. Wilson Charles whether he could say anything on the point Mr. Northcroft made at previous meeting. By attributing the trouble to heredity one only pushed the question back to a previous generation; it still had to be determined how the malocclusion originally occurred, whether it arose as a result of environment conditions or not.

Mrs. Lindsay said Mr. Wilson Charles had given them a great deal to think about and had crowded so much into his paper that it was difficult to take up the points as they arose. With regard to the first part of the paper, in which he seemed to throw doubt on evolution, she wondered how he accounted for all the evidence that had been brought forward from time to time with regard to the anthropoid condition of the newly born child. If, for example, a baby was given something small to pick up it pushed it; it did not understand how to grasp or to use its thumb. That was an anthropoid trait, and there were many others. There was also the question of the tail. In the late war, she believed, there were many evidences in the examination of recruits that there had been a tail at birth and that this had been amputated. There was also the question of gill clefts. Those points seemed to suggest a lower stage at some time or other. There was, of course, a remarkable adaptation of one part of the body when another part was lost. Bland Sutton showed a case in which a great toe was lost and the second toe took on the form of the great toe. She wondered whether Mr. Wilson Charles was acquainted with Mr. Wood Jones's book *Arboreal Man*, which seemed to suggest that the human foot was going in the same way as that of a horse, and that one day—thousands or even millions of years hence—human beings would have one toe instead of five.

Mr. Livingston said, though he had followed the paper with great attention, he was not clear as to the point of it, except that Mr. Wilson Charles seemed to have become an agnostic and not to believe in anything at all. He would like Mr. Charles to clarify his position and define it with regard to heredity, acquired and congenital disease, environment and habit.

Mr. Lindsay said that Mr. Wilson Charles had stated in the early part of his paper that the object of a paper was to promote discussion. He did not know whether it was in some sense a reflection on that remark that Mr. Charles had by his paper practically killed discussion. However, there were points in which he thought Mr. Charles might be commended for that. He gathered from his references to natural history that in future "out of the mouths of babes and sucklings" there would come the science of ornithology, and he presumed the author was going to discover the science of orthodontics in the same manner. Putting that aside, he thought Mr. Charles had called attention to a condition of affairs which required change. He had directed attention to the type of research from which it was likely that in the future the most valuable results would be obtained. At present a fair amount of money was being spent on research—so-called research as to a large amount of it—and one was liable to place too great value upon things that were done in laboratories and on experiments on animals which really did not take one very far. He thought it was time to get away from that, and he believed that was what Mr. Charles had in his mind, namely, that it was from the clinical observer that the great mass of valuable research would come. It was impossible to do without experiments in the laboratory, or without the mathematical measurement of the jaws, but these had been promoted to an importance which they did not deserve, and he gathered that Mr. Charles thought that such a society as the one he was addressing, by a careful collection of cases and a tabulation of results from actual experience in clinical practice, would probably do as much or more for orthodontics than these other methods. He was not going far into a discussion of the cases by which the author supported his argument that nothing whatever was known about orthodontics. It was a little difficult to keep the cases in one's mind while listening to the paper. He wished the Society would revert to a practice which it formerly followed, namely, that of issuing galley slips of the paper before it was presented at a meeting, so that the members could look at it and frame some ideas which might be of value for the discussion and give the reader of a paper the support he deserved. It was quite impossible to give serious consideration to the points

brought forward merely by listening to them as they were referred to and they were exceedingly interesting points. He was tempted to remark that the deformity in the case of thumb-sucking referred to was a departure from the normal caused by the thumb-sucking and that there was a return to it as soon as the thumb-sucking was given up. It was a normal case at the start, though distorted by adventitious circumstances for a few short years, reverting to normal as soon as it had a chance to do so. The other cases were exceedingly interesting, though nothing was said about the condition of the teeth with reference to structure and decay. From the models shown on the screen it would seem that there were comparatively few cavities present. He thought it possible to sum up the position by saying that, after all, very little was known about the great questions of heredity and environment, and perhaps even less of the principles underlying malocclusion, but Mr. Charles had shown the way which must be followed in order that something might be learned on those great matters, and on that account he would like to join with others in thanking him for a very enjoyable evening.

Mr. Wilson Charles, in reply, said the President had referred to webbed feet. A book entitled *Heredity in Man* had just been published by Gates, which went into the question very fully. Much was said about webbed feet in that work, which was one he intended to offer, if the Society would accept it, to the library in company with one or two other books which he hoped might be of interest. He had not the remotest idea why children crawled as he had had very little experience of crawling children, but most of the children with whom he had been connected seemed to have progressed feet first. He had spoken on a former occasion about the question of environment and heredity and had pointed out that in a case where the environment had produced the malocclusion, when the cause which had produced the malocclusion was removed there was a tendency to return to the normal condition. On the other hand, when the malocclusion was inherited—whatever view one held about that—it did not return to normal. Mr. Bragg asked about the cause of the malocclusion in the parent. That was a matter he had not discussed because it required a considerable amount of experimental evidence which he had not been able to find. His own impression was that there was no reason why, if two types were crossed, some irregularity should not be produced. If a bulldog were crossed with a retriever of a greyhound, one was very likely to get some peculiar formation of the teeth in the progeny, and in the same way by crossing two somewhat dissimilar types of human beings malocclusion might conceivably be produced, though that was a matter on which he hardly liked to express an opinion. Mrs. Lindsay and Mr. Livingston suggested he was doubting evolution. His point was not that he doubted evolution, but that evolution was regarded by the majority of people today as fact absolutely proved, which it was not; it was still a theory. What was so remarkable was that even those scientists who doubted evolution—and there was quite a number of them—were so impressed with the idea of evolution that their conversation was all in terms which showed that at the back of their minds they believed in it. Evolution had become a fact to them, and yet evolution, as it was generally taught, was quite unproved. He read Prof. Wood Jones's book some years ago but could not remember what he thought about it. He would be pleased to explain his views to Mr. Livingston and to explain to him that he was not so much an agnostic as he might have given people to think. He would like to thank Mr. Lindsay for restating the object of his paper. The paper was intended to promote discussion, but it was primarily intended to interest people in the collection of statistics about the matters with which it dealt. He was perfectly convinced that much more was going to be done by the collecting of clinical facts about such matters than by any amount of laboratory work. He had done a considerable amount of laboratory work at one time himself and he still did it, but nevertheless he was quite convinced that it was only by the collection of statistics in the way he had suggested—it did not matter whether it was with regard to birds, animals, or human beings—that it would be possible to learn something about what really happened. As far as the models he had shown were concerned, the children from whom they were taken were all practically free from caries. He thought, however, that that was only because their teeth were x-rayed three or four times a year and the earliest traces of caries removed, because he found with all of them caries tended to be very rapid when it started. He thought on an average they had only two small holes each. Mr. Lindsay remarked that when child B

stopped thumb-sucking her teeth returned to normal. The interesting part was that when she was quite tiny her molars were in buccal occlusion, so that there was apparently some tendency to irregularity. She sucked her thumb until she was twelve, but now that she was fifteen years of age her teeth were gradually returning to normal. While he was convinced that that was due to the fact that the cause had been removed and there was a natural tendency for her teeth to return to normal, yet it was rather remarkable that after a child had consistently sucked her thumb like that the teeth should return to normal. He thought the girl was very lucky to have teeth which behaved like that.

SOLDERING INSTRUMENTS AS USED WITH THE LINGUAL TECHNIC*

By Russell E. Irish, B.S., D.D.S., Pittsburgh, Pa.

No. 1. Half-round tube holder, so constructed as to make possible accurate soldering of tubing to band.

No. 2. Round tube holder, used in soldering round buccal tubes to bands.

No. 3. Half-round wire holder, so constructed that in soldering, the half-round wire is at right angle to the base wire, uniformly even to the base wire and half-round tubing. The half-round wire in its relation to the base wire

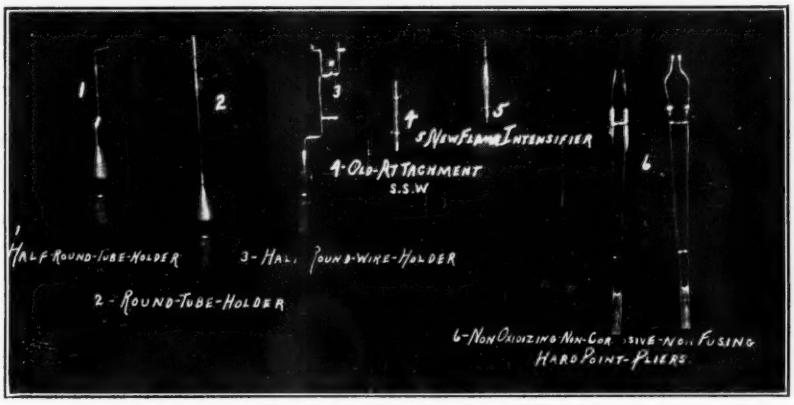


Fig. 1.

is one-quarter inch from the end of the base wire when soldered. After soldering, the relative length of the half-round wire to the tubing is the same. There is little waste.

No. 4. Old Grunberg attachment. No. 5, the new attachment which gives a flame that is very small and fine, making possible soldering we like to do, and is not always blowing out. The flame may be made large or small by varying the amount of gas and air. (Adaptable to natural or artificial gas.)

No. 6. Hard point pliers of noncorrosive, nonoxidizing, nonfusing, precious metal.

They make possible more accurate soldering, cleaner acid, and the grips do not become hot while soldering.

*Clinic presented before the American Society of Orthodontists, St. Louis, Mo., April 21 to 24, 1931.

SHOULD A DENTIST WEAR A MASK?

By Herbert V. Mellinger, M.D., Los Angeles, Calif.

AT LEAST a dozen diseases are transmitted by means of the spray of droplets which we always expel from the nose during respiration and from the mouth during respiration and speech. Those of most importance to the dentist are common cold, tonsillitis, influenza, pneumonia, and tuberculosis. The dentist is no more resistant to infection than the average person. When a dentist is sick, his income stops and his overhead expense continues as usual. Besides the discomfort of being sick, there is its double cost.

The term "diphtheria carrier" has become rather generally known. There are also carriers of flu and other diseases. The term means that the carrier harbors bacteria in his tissues but is able to overcome their effect and to remain well. Even in health, we frequently if not always carry several varieties of bacteria in our throats. The people with whom we come into contact may be very susceptible to the germs which we harbor with impunity.

More than thirty years ago Flügge[1] discovered that patients suffering with tuberculosis expelled during coughing a spray which contained living germs. In 1901, Hutchison[2] experimenting with *Bacillus prodigiosus* found that within a building germs were carried to a distance of 160 feet, and there made cultures. During the intervening years several investigators have found streptococcus, staphylococcus, Klebs-Löffler bacillus, and many other pathogenic bacteria present in normal throats of well people, and expelled by them during respiration or speech.

The surgeon while operating has masked his face with gauze. During the epidemic of influenza in 1918, Capps[3] recommended the masking of patients and of attendants. There never has been a standard mask of any sort, and gauze masks have varied greatly in size, mesh, and number of layers. In New York City in 1925[4] and in Boston in 1927[5] epidemics of infection of clean operative wounds with hemolytic streptococcus were proved to have been caused by unmasked or improperly masked operating room personnel. A number of investigators have experimented with masks of various sorts, and they agree that if the mask itself is efficient the possibility of leakage around the edges of the mask is absolutely negligible.[5, 6] Since his patient is usually asleep, the surgeon has been willing to wear a very unsightly mask.

The dentist's patient on the other hand is usually awake, and is quite concerned with the dentist's good appearance. Because of this, up to the present time the dentist has run his chance of receiving an infection from his patient and of transmitting one to him. He has also endured the discomfort of many nasty breaths, and more than once he may have declined a salad made tasty with onions or denied himself the solace of a cigarette because of the possible effect of his breath upon the patient.

At last the dentist can be protected as well as the surgeon. A protective mask has been devised which is not only cool and comfortable but also impermeable, and stops any spray or moisture. The odor of the breath proceeds with the spray, and may never get around the edge of this mask.

The mask is composed of two parts. The mask support is made of 14 carat gold-filled wire, gold because it looks well and filled in order to obtain the necessary springiness. It is made in three sizes, although the majority of people require the medium size. It is formed to fit the contour of the face. Since each individual face is of slightly different proportions and contour

Fig. 1.

from any other face, it is frequently necessary to bend the mask support slightly in order to make it fit the individual face accurately. There is no necessity for its being sterile, but if desired it may be sterilized by any of the approved methods. A mask support will last as long as it is well treated.

Masks are all alike. The mask is of very resistant paper waxed on both sides. It is so translucent that the features can be seen distinctly through it, and children are not at all dismayed. Its upper part is in intimate contact with the nose and cheeks. Thus spectacles can never become steamed. Its lower edge hangs free in such a position that it just clears the front of the gown when the head is flexed and turned. The breath is reflected downward and laterally close to the wearer's body.

It requires a little care and practice to learn to apply the mask properly to the face, but it is a simple matter. When once properly applied the mask will never come off unless it is taken off. One can wear the mask for hours as comfortably as one wears spectacles. He can breathe easily and talk freely in perfect safety. It is no more necessary to sterilize the mask than to sterilize spectacles, but if it is required the masks may be sterilized by exposure to the fumes of formaldehyde gas. Whenever a mask is taken off, it should be destroyed. Always apply a new mask.

Such a mask is not only a health protector to the dentist and to his patient, but also an assurance against economic loss. Surely the dentist should wear a mask.

REFERENCES

1. Flügge, Carl: Ueber Luftinfection, Ztschr. f. Hyg. u. Inf. Krank. **25**: 179, 1897.
2. Hutchison, Robert F.: Die Verbreitung von Keimen durch gewöhnliche Luftströme, Ztschr. f. Hyg. u. Inf. Krank. **36**: 221, 1901.
3. Capps, Joseph A.: New Adaptation of Face Mask in Control of Contagious Diseases, J. A. M. A. **70**: 910, 1918.
4. Meleney, Frank L., and Stevens, Franklin A., Jr.: Postoperative Hemolytic Streptococcus Wound Infections and Their Relation to Hemolytic Streptococcus Carriers Among the Operating Personnel, Surg. Gynec. & Obst. **43**: 338, 1926.
5. Walker, Irving J.: How Can We Determine the Efficiency of the Surgical Mask? Surg. Gynec. & Obst. **50**: 266, 1930.
6. Kellogg, Wilfred H., and MacMillan, Grace: An Experimental Study of the Efficacy of Gauze Face Masks, Am. J. Pub. Health **10**: 34, 1920.

DEPARTMENT OF ORAL SURGERY, ORAL PATHOLOGY AND SURGICAL ORTHODONTIA

Under Editorial Supervision of

Sterling V. Mead, D.D.S., Washington, D.C., Director

M. N. Federspiel, D.D.S., M.D., F.A.C.S., Milwaukee.—Vilray P. Blair, M.D., F.A.C.S., St. Louis, Mo.—Theodor Blum, D.D.S., M.D., F.A.C.D., New York.—Leroy M. S. Miner, M.D., D.M.D., Boston.—Wm. L. Shearer, M.D., D.D.S., Omaha.—Frederick F. Molt, D.D.S., Chicago.—Robert H. Ivy, M.D., D.D.S., Philadelphia.—Edward L. Miloslavich, M.D., Milwaukee.—French K. Hansel, M.D., M.S., St. Louis, Mo.—W. M. Reppeto, D.D.S., Dallas, Texas.—Leo Winter, D.D.S., New York.

THE SURGICAL PREPARATION OF THE MOUTH FOR DENTURE PROSTHESIS*

By Leo Winter, D.D.S., New York, N. Y.

Professor of Oral Surgery and Minor Surgery, New York University College of Dentistry; Visiting Dental Surgeon in Charge, Bellevue Hospital; Oral Surgeon, Flower Hospital

AMONG the members of the dental profession, it has become axiomatic, given edentulous maxillary and mandibular ridges of normal height, health, width, and contour, that with the exercise of reasonable skill and accuracy, a set of esthetic, serviceable dentures can be constructed. And let me, at this time, stress the point that the only physical phenomena which would be necessary to retain these appliances would be adhesion and cohesion—the adhesion being that of two perfectly adapted surfaces (the denture surface and the mucous-membrane surface), through the medium of the saliva, and the cohesion being that force which tends to hold the molecules of the saliva together. When these conditions exist (namely, adaptation, adhesion, and cohesion), there comes into play the additional retentive force of atmospheric pressure, relegating to the limbo of the worn-out, unscientific methods of the past such means of denture retention as suction chambers and mucilaginous pastes and powders. In the days when the importance of proper impression taking was still deprecated, when consequently a scientific technic for securing impressions was as yet not developed, when a limited knowledge of proper flasking and vulcanizing resulted in the warping of dentures, there may have been some excuse for auxiliary devices. But, today, these adverse conditions do not obtain, and we should make every effort to normalize the oral structures, through surgery or orthodontia if necessary, so as to utilize the modern technic of denture prosthesis. It is with a desire toward enumerating the principal abnormalities and mutilations which

*Being in the main the substance of an address delivered at the Better Dentistry Meeting of the First District Dental Society of the State of New York.

render scientific prosthodontia difficult if not impossible, and to demonstrate how surgery can remedy these conditions, that this symposium on the surgical preparation of the mouth has been instituted. For our purpose here, these mal-

Fig. 1.

Fig. 2.

formations may be classified under the following heads: 1. Abnormalities and mutilations of the alveolar process and of the palate necessitating alveolectomy. 2. Hypertrophied tissue and flabby tissue. 3. Abnormal labial frena and other muscle attachments.

Alveolectomy, by way of review, may be defined as that operation involving the removal of a part or parts of the alveolar process. For our discussion, we shall amplify the connotation of the term "alveolectomy" to include the removal of bony excrescences from the palate. These latter are, of course, far less usual than most of the other abnormalities of the maxilla or mandible. The jaws, especially the maxilla, are subject to a great variety of malformations which fall into two divisions; those deformities that are hereditary or congenital, and those that are acquired.

Under the first classification, we may include one of the most frequent obstacles that beset the path of the prosthodontist, namely, massive undercut maxillary tuberosities. Although when teeth are present, they have no practical

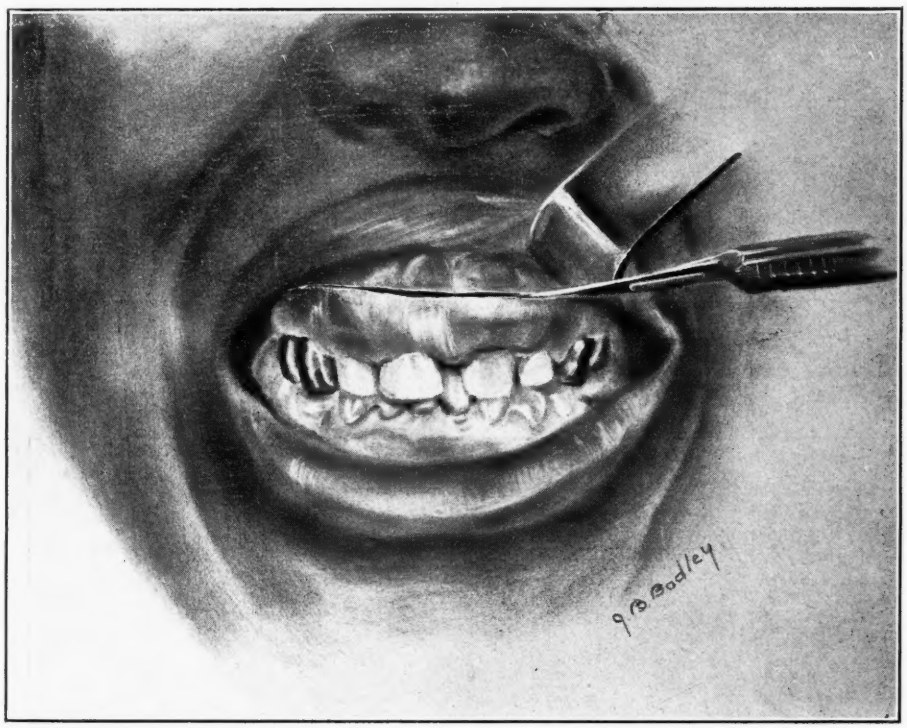


Fig. 3.—Alveolectomy. The nature of the incision must necessarily be just below the high lip line, produced by having the patient smile. In an exaggerated case of this type, the incision is carried from tuberosity to tuberosity, lingually and buccally as shown on the models.

significance, they assume major importance when the teeth are lost and it becomes necessary to construct full dentures. Of a similar nature is the protruding, overdeveloped alveolar process of the Angle Class II malocclusion case, in which the anterior portion of the maxillary ridge extends far beyond the mandibular, rendering prosthesis difficult and limiting the esthetic attributes of the completed denture. The mandible offers one outstanding congenital deformity in the presence of an unusually developed ridge of bone on the lingual surface of the mandible, producing a shelf-like excrescence which interferes with peripheral seal and the use of a lingual bar appliance. At times, an unusually wide maxillary or mandibular ridge or both make alveolectomy advisable, especially when this condition is accompanied by extreme length of the ridges them-

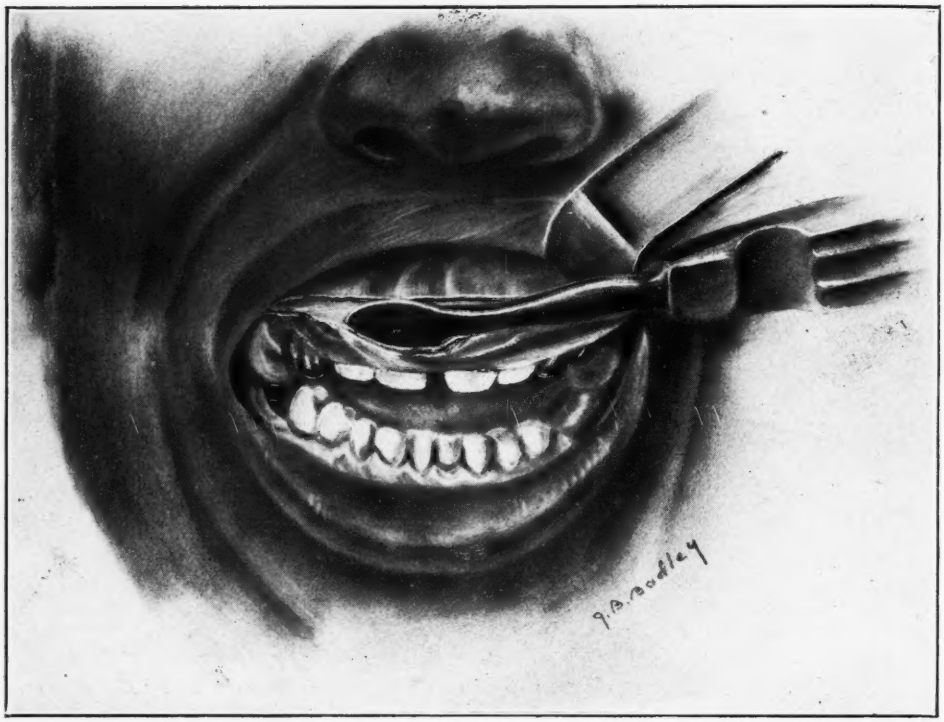


Fig. 4.—Alveolectomy. Showing flaps being retracted downward after extraction of the teeth. If this principle is followed, we have a definite landmark to guide us in removal of bone, in regard to height.

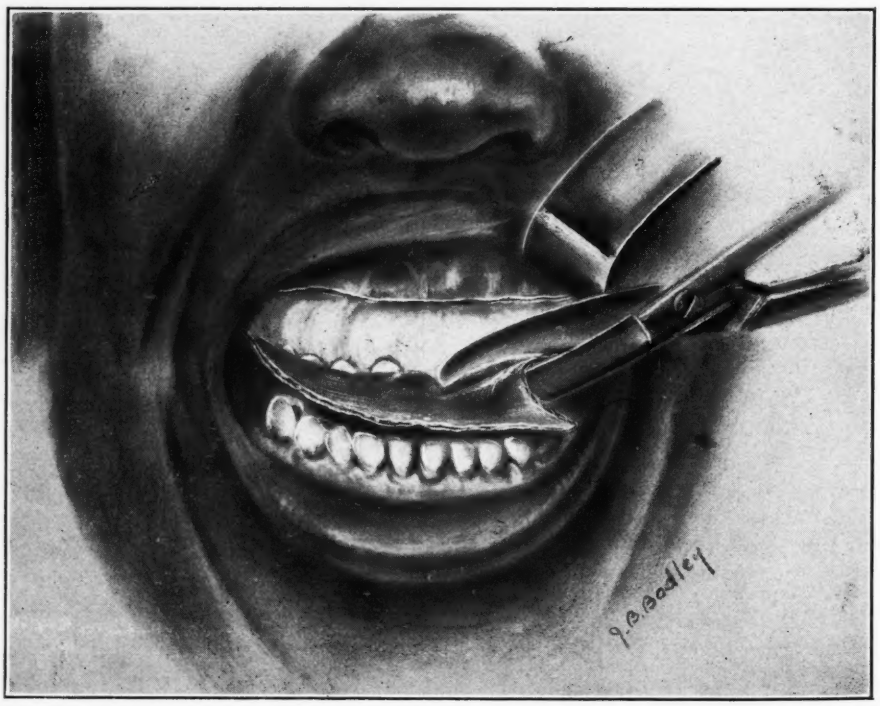


Fig. 5.—Alveolectomy. The buccal flap is now cut away, and the same technic is followed with the lingual excess mucous membrane.

selves in the vertical direction, in which case there is often insufficient intermaxillary space for the insertion of artificial teeth.

As far as acquired mutilations of the alveolar process and body of the bones are concerned, it will be noticed that they are mostly the sequelae of exodontic procedures. Retained roots and apices of roots, residual infection, and areas of osteosclerosis (condensing osteitis, osteogenesis) are all indications for alveolectomy, the more so since the latest research places these conditions high in the list in regard to the etiology of atypical neuralgia. In this connection might also be mentioned another frequent cause of dental neuralgia—sharp projections of the alveolar process. That these irritating extensions of the bony structures must be removed before a denture can be worn is too self-evident to

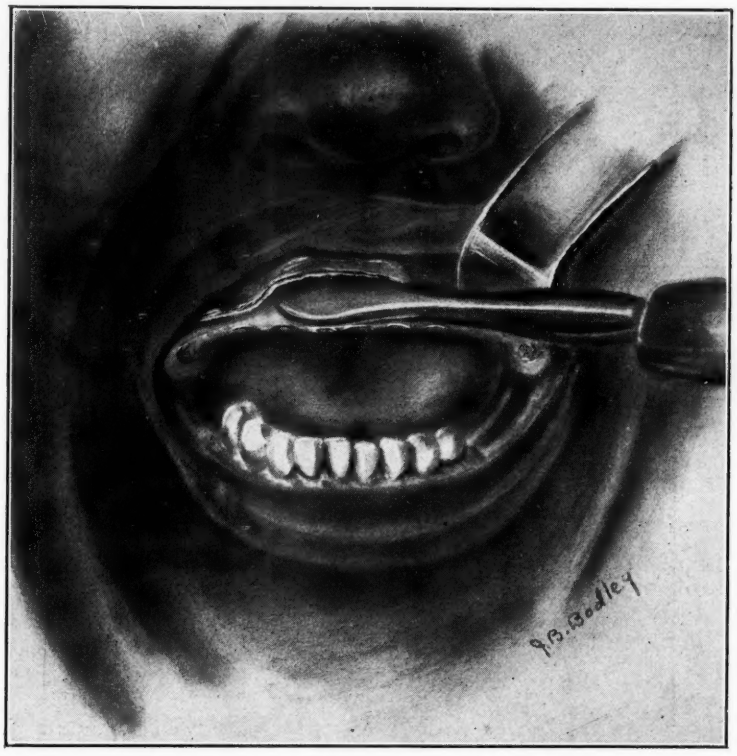


Fig. 6.—Alveolectomy. When the case has been reduced in height, the mucous membrane is retracted upward, exposing the bone to be removed facially.

require comment. Exodontia is responsible for still another malformation of the jaws, the fracture of the buccal plate of bone, resulting in a marked deformity. Furthermore, when any dental organ in either the maxilla or the mandible has been lost, it has been found that its antagonist on the opposite jaw continues to erupt into a position of supraocclusion. Naturally, the extraction of this antagonist at some future date would leave an alveolus which would be considerably higher than those of the adjoining teeth. The only remedy for such an irregularity is surgery. Periodontoclasia (pyorrhea alveolaris), too, leaves its mark upon the alveolar process even in edentulous areas. As a result of the destruction of the crest of the alveolus and of the alveolar bone proper (alveoloclasia), there remains a distinct malformation in the form of a dipping down or downward move in the ridge. Very often, it

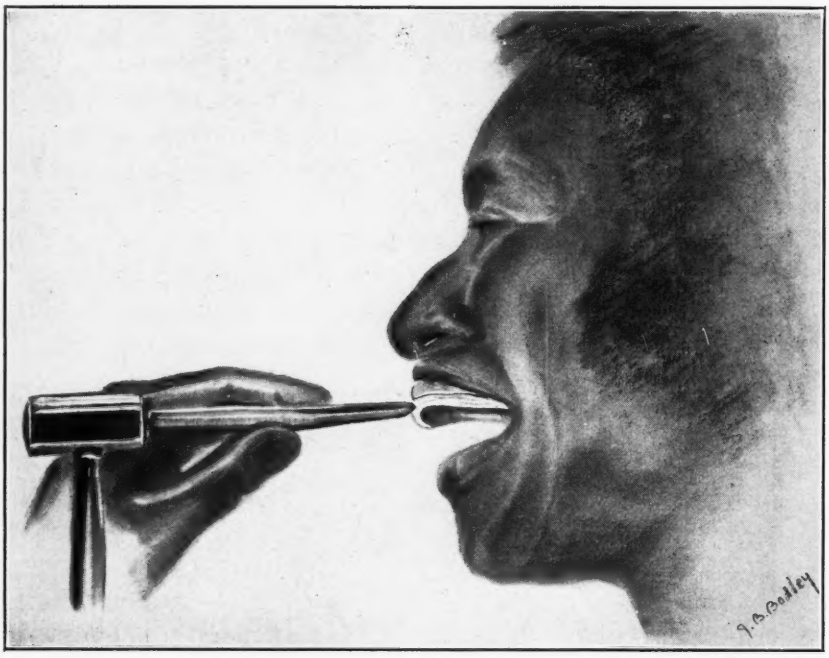


Fig. 7.—Alveolectomy. Sagittal view showing excess of bone removed up to the line of incision, thus maintaining the original landmark.

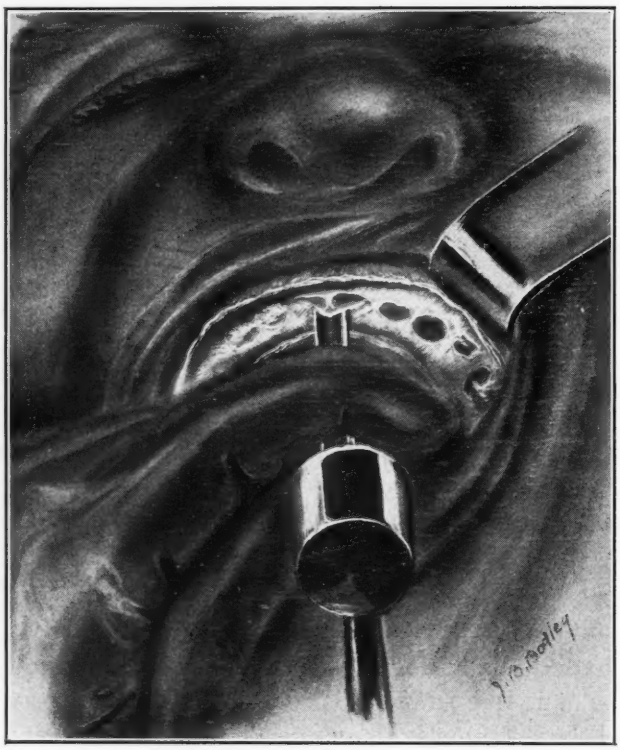


Fig. 8.—Alveolectomy. Illustrating method of removing bone facially, the amount being governed by the bite of the patient.

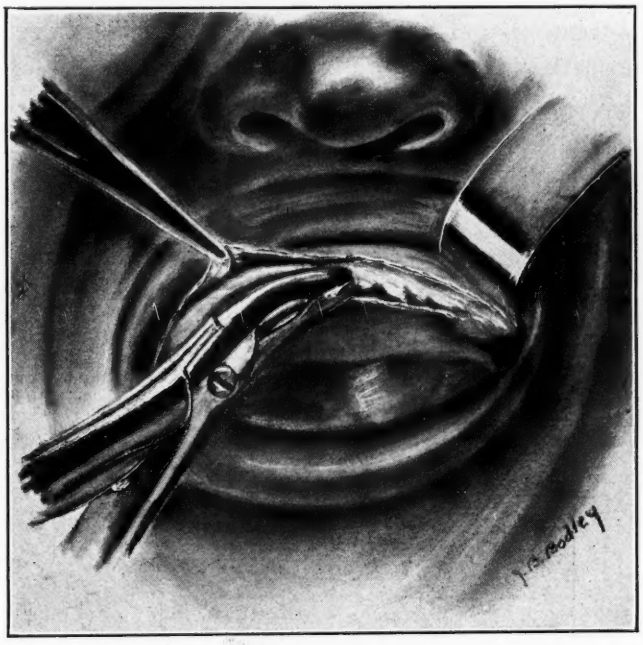


Fig. 9.—Alveolectomy. Rongeur forceps are used to round off all sharp edges.

Fig. 10.—Alveolectomy. Flaps brought back and sutured. Sockets are now treated lingually and buccally with Mallophene dissolved in distilled water.

becomes necessary to "even out" an edentulous ridge where several of these areas alternate with normal portions of bone.

It must be remembered that the successful alveolectomy is that which goes beyond the mere removal of the sharp bony process or of the protruding

Fig. 11.—Completed case.

Fig. 12.—Completed case with artificial denture.

bony mass and from incision to final suture takes into account the restoration of normal structural relationships and the normal function of the part. Perfect anesthesia may be secured with comparative ease by simple infiltration for the entire maxilla and for the anterior part of the mandible. Surgery on the posterior portion of the mandible would, of course, necessitate conductive

anesthesia, the inferior alveolar-lingual combined with the long buccal injection. In deep alveolectomy of the maxillary tuberosities, a more profound anesthesia may be induced by combining the posterior superior alveolar with the anterior palatine nerve injection. In all these procedures, a 1.5 to 2 per cent novocain solution containing suprarenin should be employed, a higher percentage of suprarenin being preferable due to the desirability of a bloodless field.

The incision for alveolectomy, obviously, will vary with the extent of the proposed operation. Where the removal of a single sharp point of process is intended, a vertical incision mesial to the affected area extending from the mucobuccal fold to the crest of the ridge and then running horizontally along the crest is all that is required. For the excision of larger masses of bone, a choice is offered between two types of incisions. The first consists of a horizontal cut through the mucoperiosteum to the bone along the crest of the ridge extending slightly beyond the limits of the area to be excised. The second entails cutting

Fig. 13.—Models of the case before treatment was begun.

horizontally to the bone just below the crest of the ridge both on the lingual and on the labial aspect of the ridge and converging the incisions at the crest anteriorly and posteriorly, forming a flattened ellipse. The area of mucoperiosteum included in the ellipse is, of course, lifted away and discarded, with a suitable periosteal elevator, the mucoperiosteum is retracted from the bone for a considerable distance from the lips of the incision and held back in order to permit the excision of the projecting bone by means of rongeurs, bone files, and large curettes. From time to time, the flaps are replaced and the results is observed. No more osseous structure should be removed than is absolutely essential. Depending upon the amount of bone excised, it will be found, if the first type of incision has been made, that there will be considerable overlapping of the lips of the incision. This should be corrected by cutting away sufficient tissue on either side of the incision in order to expedite healing and to avoid the formation of a ridge of flabby mucous membrane. In the eventuality that it is necessary to exert force to bring the lips of the wound into juxtaposition, as will

probably be the case if the second type of incision is employed, "stay sutures" of double-strand horsehair or of a heavy grade of horsehair should be inserted in order to relieve tension on the final sutures, which are then placed.

In operating for the removal of bony excrescences on the hard palate (torus palatinus), great care should be exercised not to sever the posterior palatine artery. It is advisable to follow any suturing by an application of Mallophene in glycerine over the sutures to reduce the possibility of infection

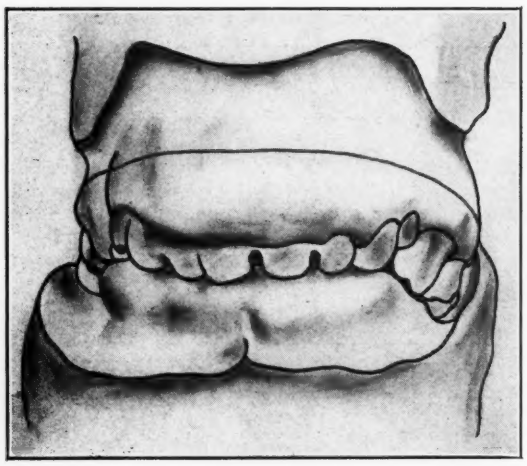


Fig. 14.

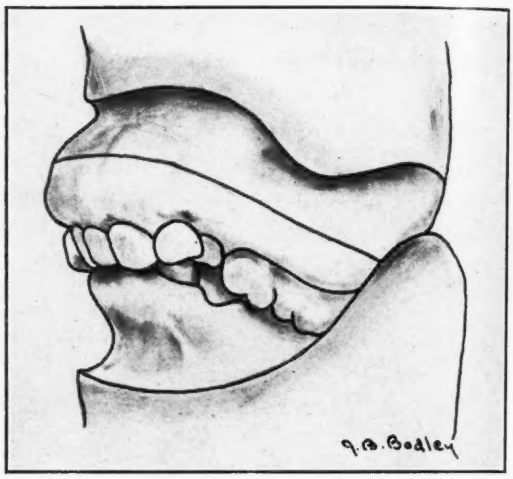


Fig. 15.

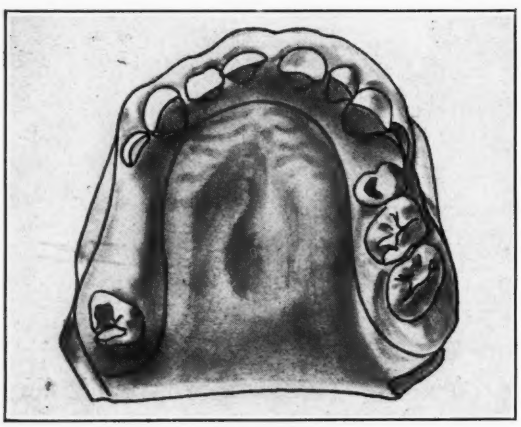


Fig. 16.

Fig. 14.—Front view of incision on model.
Fig. 15.—Side view showing nature of incision on model.
Fig. 16—Illustrating nature of incision on lingual surface.

at these points, the so-called "stitch-abscesses." Mallophene (Mallinckrodt) is an azo dye, which clinically has given us most excellent results. It has a marked bactericidal action, without destroying the tissue. Mallophene, when used for this purpose, is best prepared by incorporating the powder with a few drops of glycerine. As is the case with all bone surgery, even a mildly extensive alveolectomy may be followed by pain and swelling.

To control the swelling, the patient should be instructed to apply cold compresses or ice-bag to the outside of the face for thirty minutes of the hour.

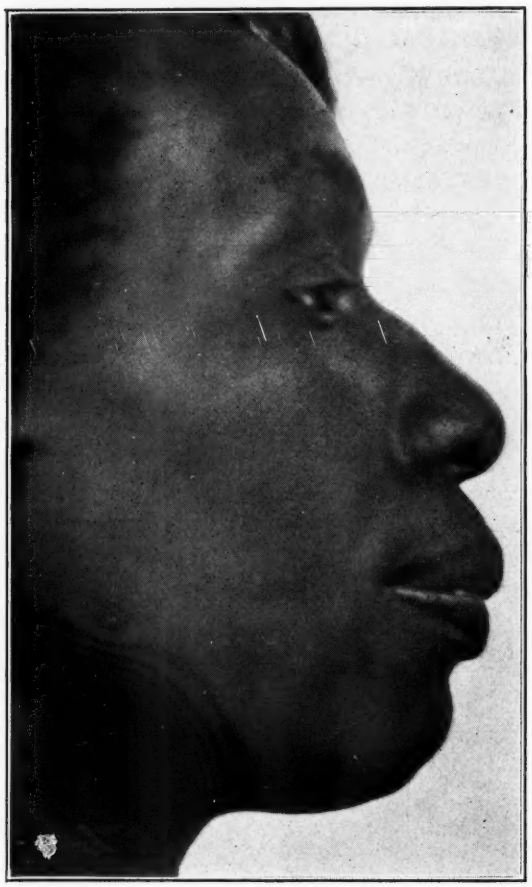


Fig. 17.—Photograph of patient, showing need for alveolectomy.

Fig. 18.—Photograph of patient after case was completed.

For purposes of maintaining the tone of the wounded tissues, Mallophene, dissolved in distilled water, should be applied daily. Mallophene for this purpose is prepared by placing one part of powdered Mallophene to two parts of distilled water in a test tube and heating it over a Bunsen flame until the powder is completely dissolved. It should then be permitted to cook slightly and should be applied with a sterile cotton applicator. Sutures may be removed in six to eight days.

We come now to another condition which is essential for successful denture construction—hypertrophied tissue. Hypertrophied tissue or inflammatory hyperplasia of the alveolar and buccal mucosa is a benign neoplasm, whose origin can be traced to constant irritation over a long period. The mass consists of individual fibrous tissue cells which are normal in structure and function but which are found in enormous numbers, some adiopse tissue, and, in the

Fig. 19.—Hypertrophy of upper lip and buccal fold. Showing a soft, nonvascular, lobulated mass, arising from buccal fold and lip. This condition was brought about by irritation of the upper denture.

anterior part of the mouth, a rich supply of blood vessels. When the hypertrophy involves the mucosa close to the lips, it produces a condition generally known as "double lip." In this connection, it is convenient to consider also the question of the flabby tissue which prosthodontists often find overlying the ridge—tissue which is so soft and movable that the retention of the denture is well-nigh impossible. One of the most frequent causes of this abnormality is the failure of the dental surgeon to trim away the excess gingival structures following multiple extractions. As a result of this negligence, healing occurs, producing a thick ridge of flexible cicatricial tissue. Such a base forms a very poor foundation for an artificial denture. It should be emphasized that superficial excision of the overhanging tissue is valueless in view of the fact that a mass of cicatricial tissue will form, which is almost as detrimental as the loose hyperplastic area. The proper operative procedure is to make an incision to the

bone well above the mass to be excised, both on the lingual and on the buccal or labial surfaces, the extremities of the lingual and buccal incisions converging exactly as for alveolectomy. Following the enucleation of the mass from the

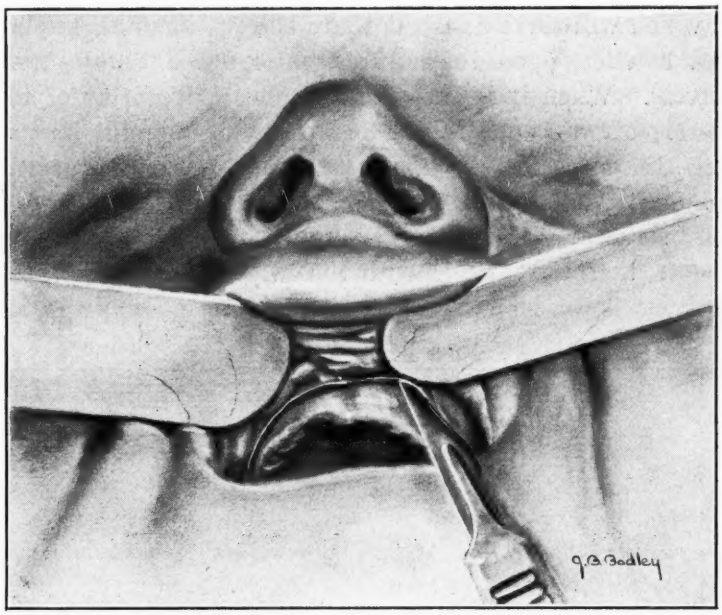


Fig. 20.—Hypertrophy of upper lip and buccal fold. Showing incision being made just below lower border of mass.

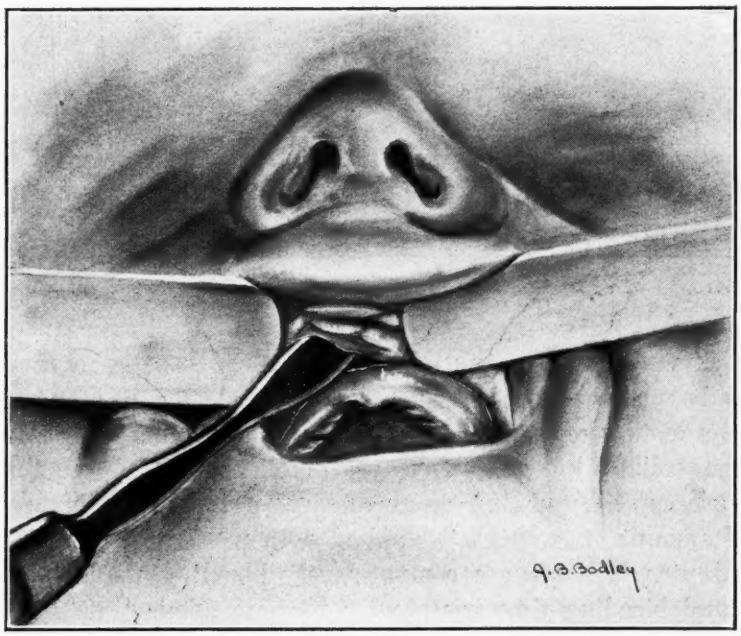


Fig. 21.—Hypertrophy of upper lip. Periosteal elevator raising tissue upward.

bone, the mucoperiosteum located to the lingual and labial of the growth is dissected free of the bone for a considerable distance so as to render the flaps sufficiently elastic. A much more excellent result is obtained by stretching the palatal or lingual flap so that it covers the dental ridge and also part of

the labial or buccal surface. The rationale of this technic lies in the fact that there is consequently less necessity of stretching the labial flap, so that contraction of the cicatrix will not produce a drawing in of the lips and so that the mucobuccal fold will remain as deep as possible, thus restoring the normal height of the ridge, which will serve as the denture base. Since this method will bring about marked traction upon the sutures, interrupted "stay-sutures" are essential to success. When it is desired to remove a quantity of the loose, soft mucosa which is often found in the maxillary or mandibular premolar and incisor regions, the same technic may be pursued as has been outlined for the excision of hypertrophied tissue. It will be remarked that we are dealing here with soft structures abundantly supplied with blood vessels. It hardly seems necessary, therefore, to extend the warning that profuse persistent capillary bleeding is to be expected—with strong possibilities of secondary

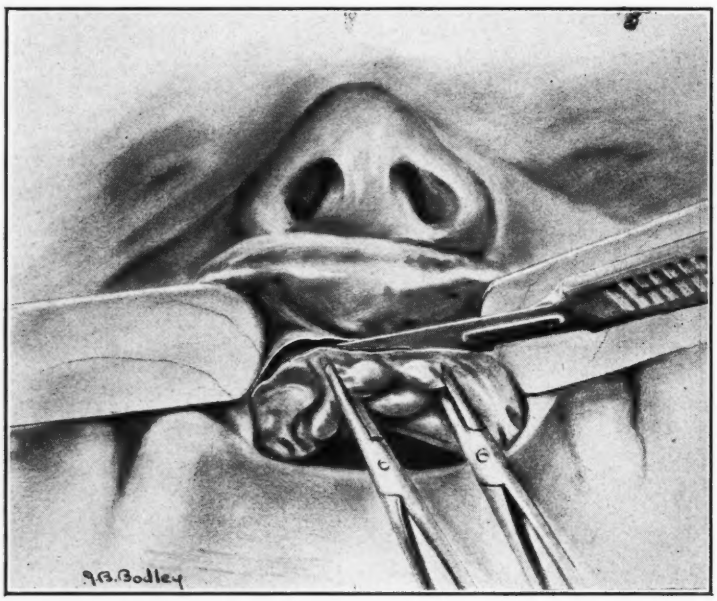


Fig. 22.—Hypertrophy of upper lip. The incision is now completed at the superior border, down to the periosteum, and mass removed.

hemorrhage as well. All precautions should consequently be taken, and all preparations be made to control such bleeding, should it occur. When the patient gives a history of excessive bleeding, premedication with capsella Bursa pastoris—commercially known as Styptysate will be found to be very effective. Should profuse capillary oozing occur during the operation, gauze, saturated with a small amount of Styptysate applied with pressure and kept in position for a few minutes, will leave a comparatively bloodless field. Measuring the coagulation and bleeding time is urgently recommended.

It too often happens, among general practitioners, that the dentist gives up a prosthetic case as a failure or decides that it is impossible because of the apparent absence of a ridge. If the anatomy of the bony structure of the maxilla and mandible is taken into account, it becomes readily apparent that a normal ridge may be reconstructed by the simple procedure of cutting into the mucobuccal fold so as to sever the muscle attachments. The technic for

this operation will shortly be described. We will first concern ourselves with the problem of abnormal frena and other muscle attachments.

Frequently, the labial frenum and the infrazygomatic insertion of the buccinator muscle which is found in the premolar region are so low as to prevent the wearing of a denture. Especially is this true of the frenum, which is very often found attached to the crest of the maxillary ridge or even palatally. The lingual frenum of the mandible is at times similarly situated. The correction of this condition is simple. After anesthetization of the area by infiltration with a 1.5 to 2 per cent novocain-suprarenin solution, the frenum is rendered taut by retracting the lip or tongue, as the case may be, and is then severed close to the alveolar bone by applying the knife, the surgical diathermy, or the actual cautery. To prevent re-adhesion of the muscle to the bone, a layer of gauze saturated with Mallophene is inserted between the sides

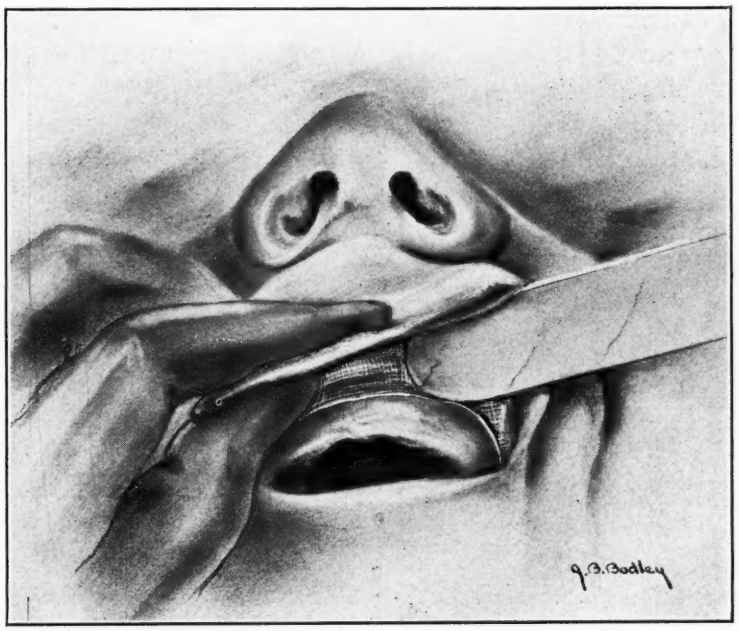


Fig. 23.—Hypertrophy of upper lip. Illustrating manner of placing a flat piece of gauze, saturated with Mallophene, to prevent reattachment of the tissues removed. This form of treatment results in rapid healing and formation of a soft fibrotic scar, which is most desirous from a prosthodontist's point of view.

of the wound. Healing will occur rapidly. It is best to insert the denture as soon as possible so as to permit the tissues to adapt themselves around its peripheral flange. When this is done, the edges of the vulcanite should be rounded, smoothed and polished.

Another malformation which is the source of considerable annoyance is the obliteration of the maxillary condyle through the abnormal attachment of the pterygomandibular ligament, thus producing a condition in which there is apparently no condylar protuberance. Since the retention of the maxillary denture depends largely upon peripheral seal in this region, it becomes an almost insurmountable problem to wear a denture unless the condyle is surgically reconstructed. The technic here is the same as that for any muscle attachment. The pterygomandibular ligament is severed from the tuberosity and the denture

is interposed between the lips of the incision—making use of the antiseptic analgesic, and stimulative qualities of Mallophene-lanolin paste.

This brings us to a consideration of the operation for producing a normal denture base in those cases that present an almost absolutely flat maxilla or mandible. Our task here is to reconstruct the ridges and condyles in the maxilla so that the completed denture may have a definite seal. It is always good practice, in these cases, to make an impression and cast of the mouth to determine to study the condition as it exists, and then to outline upon this last the extent of the changes to be brought about. Once this is determined, the field is rendered aseptic by means of mouth washes followed by painting the tissues with tincture of iodine and by removing the stain with grain alcohol. Anesthesia is secured by deep infiltration into the mucobuccal fold, reinforced by nerve blocking wherever possible. Enough suprarenin should be incorporated into the anesthetic to produce ischemia of the parts to be operated upon. With the outlined cast in mind, the cheek is retracted and the muscles at the mucobuccal fold are severed close to the bone, continuing around the arch until the tuberosity is sufficiently exposed.

In this short paper on the surgical preparation of the mouth for denture prosthesis, an attempt has been made to show how the general practitioner with a modicum of surgical skill and knowledge may hurdle most of the obstacles of prosthodontia.

A COMPOSITE ODONTOMA IN THE PRESENCE OF SYPHILIS*

By Arthur Hoge, M.D., A. L. Jones, M.D., and Edward C. Armbrecht, D.D.S.,
Wheeling, W. Va.

PRACTICALLY all tumors that attack other parts of the body may be found in the oral cavity, although there are certain tumors of true dental derivation. The composite odontoma is a comparatively rare one of the dental type, one of which is presented in the following case report:

Female, married, age thirty-three years, housewife.

Chief complaint: Pain in left cheek; fetid breath.

Fig. 1.—Composite odontoma posterior to left antrum.

History of Present Illness: Consulted her dentist for pain in the left cheek. Several teeth were extracted in the left maxillary molar region, the left maxillary second molar fractured at the alveolar margin. Several attempts to remove the roots being unsuccessful, she was referred to a general surgeon. Upon examination a bony tumor was found, and an external operation was advised, which was refused by the patient. She then came to this city to consult with a laryngologist, who, upon examination, noted a fetid

*Case reported before Staff of Ohio Valley General Hospital.

Reprinted from the West Virginia Medical Journal, January, 1931.

breath, foul discharge from the area of the left maxillary second molar, dizzy spells upon stooping, and pain in left cheek. A Wassermann with further roentgenogram study was ordered. The Wassermann test returned four-plus, and the radiologist reported a bony tumor about the size of a hen's egg just posterior to the left antrum (Fig. 1 and Fig. 2.) At this time the patient complained of constant, severe pain in the left upper cheek, which showed marked swelling. She had been losing weight, felt weak, and secured sleep only by the use of sedatives and narcotics.

Medical History: Essentially negative as to any serious disease entity.

Family History: Father died at the age of seventy-six, prostatism; mother died at age of sixty-two, from heart disease. Four brothers, ages fifty-two, fifty, thirty-five and twenty-eight years, respectively. All in good

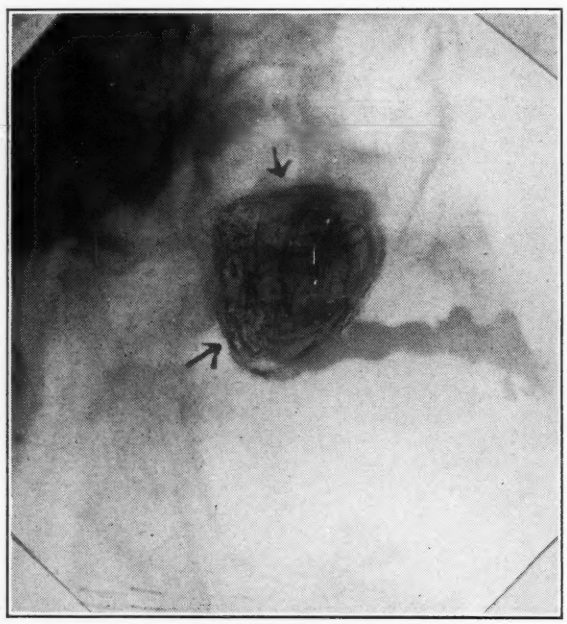


Fig. 2.—Lateral view of tumor.

health except the one aged fifty-two, who was treated for advanced tabes and bladder incontinence and has since died.

Social History: Married twice; no pregnancies or miscarriages.

Physical Examination: Poorly nourished female, age thirty-three, evidently in considerable pain and presenting a swelling of the left maxilla.

Pupils: Regular, equal, reacting to light and accommodation.

Nose: No discharge, transillumination clear, blocked high on left side with polypoid tissue; otherwise negative.

Mouth: Fetid breath; area over left maxillary molar region inflamed and pus draining from second molar area. Besides several teeth missing, a four-tooth bridge and several gold-crowned teeth were present, which were apparently free of infection. Salivary calculus on lingual surface of mandibular anterior teeth. Tongue and floor of the mouth normal. Lymphatic glands were palpable on both sides, but tender only on the left side.

Head and neck were otherwise negative; chest and abdomen were negative.

Reflexes: Patella normal; Romberg not present.

Laboratory Findings: Wassermann reaction four-plus; urine normal; blood count not made; blood pressure 125/80.

Roentgenogram Study: Bony tumor about the size of a hen's egg posterior to the left antrum.

Tentative Diagnosis: Bony tumor of the maxilla.

Final Diagnosis: Composite odontoma in the presence of tertiary syphilis.

Treatment.—We decided that the patient should undergo specific medication before any operative procedure. It was deemed advisable to start mer-

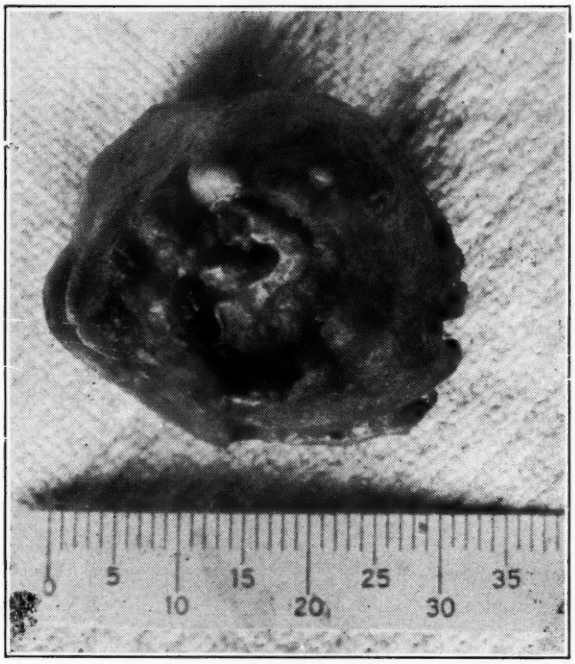


Fig. 3.—The gross specimen.

cury inunctions with small doses of saturated solution of potassium iodide, gradually increasing to one dram thrice daily. Under this treatment the pain and swelling subsided, appetite was better, and a steady gain in weight was noted. Three courses of neoarsphenamine, 0.6 gm., alternating with mercury and potassium iodide, were given. After a month's rest a negative Wassermann was secured. Bismuth intramuscular injection was refused, as was also a spinal-fluid study. Patient was hospitalized and, under a general anesthetic (nitrous oxide-ether), an incision running posteriorly and anteriorly to the region of the bony tumor was made. After the mucous membrane had been elevated, the bone exposed and buccal bone plate removed, the tumor was enucleated *in toto,* with the aid of a large curette. Fig. 3 shows the remaining tooth root of the second molar and several areas of enamel protruding from the bony mass. Thorough curettage, ronguering and filing of over-

hanging bone found in and about the cavity. Iodoform gauze packing and silk sutures were placed, permitting the incised tissue to heal by first intention and the cavity to fill up from the bottom. Cleanliness was maintained by changing the packing, also by irrigating the area with an antiseptic solution daily. Ice compresses were used externally. The patient reacted nicely and was able to leave the hospital after six days.

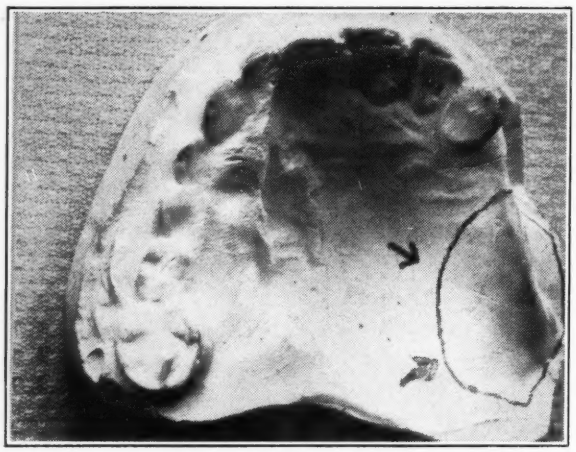


Fig. 4.—About two months after operation.

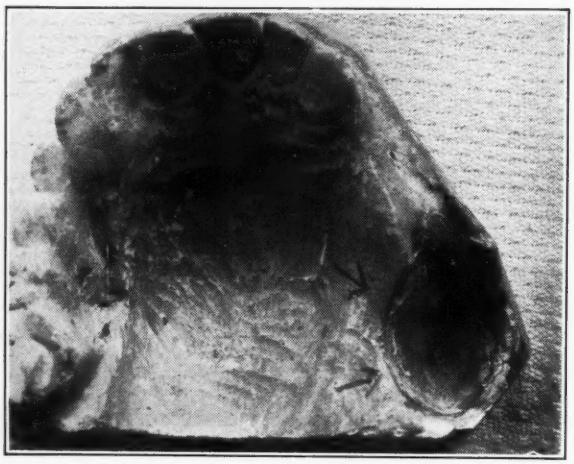


Fig. 5.—About three years after operation; contour of palatal tissue completely restored.

Gross Findings: Irregular, calcified bony tumor, the size of a large English walnut, several areas of enamel resembling malformed teeth, smaller than normal in size. The fractured roots of the left second molar were easily seen in the body of the tumor mass. A small area of necrosis could be seen, and undoubtedly accounts for the fetid breath and pus discharge, which had come from the region after the extraction of the teeth in the presence of systemic infection. A small cavity could be seen within the mass; otherwise it was solid throughout. It measured approximately 32 millimeters, as illustrated in Fig. 3, and is grossly a true composite odontoma.

CONCLUSIONS

1. Another case report showing the importance of cooperation between the medical specialties.

2. The necessity of considering the patient's general condition before any operative procedure is started. Under specific medication the patient gained weight and the general physicial condition was markedly improved, in this manner fortifying the patient for the operation.

3. The tumor was removed from within the oral cavity; the postoperative results are shown in Figs. 4 and 5. The former shows a cast of the maxilla about two months after operation, while the latter shows a cast about three years after the date of operation. In the latter we see that the cavity has filled in completely and the contour of the region is normal in all respects.

4. Stokes states, "Syphilis of the bones is usually a constructive osteoplastic process except in the cranial bones, where there is often a destructive process without regeneration."

5. It is essential to remove these tumors *in toto* and maintain cleanliness while regeneration is taking place.

COMMENT

The term *odontoma* is of Greek derivation, from *odous-odontos,* meaning tooth, and *oma-omatos,* meaning tumor. The term *composite* means "composed of two or more distinct parts." It is defined as a hard, bony, calcified tumor derived from cells concerned in tooth development; composed of bone, enamel, dentine and cementum in varying proportions and usually more than two fully formed or malformed teeth fused into an irregular mass. The term *composite odontoma* was accepted by the Anatomic Society in 1895, after Broca, who gave it this name in 1869. It is a comparatively rare dental tumor, as a careful survey of the literature reveals, and it is quite easy to mistake this tumor for other types referred to in the literature by the term *aberrant enlage.* The classifications by Hopewell-Smith, Perthes, and the British Dental Association are all so complex and lengthy that it is impossible to include them in this report. The time of occurrence is during the dentition period, but usually is not discovered until later in life. The age limit thus far reported has been thirty-six years. This tumor grows slowly, is benign, and may approach the surface, due to some irritation such as an attempt to extract teeth whose roots are embedded in the bony mass. Clinically, the condition is difficult to diagnose. The mandible is the most frequent site, although it may be found in the maxilla. The largest tumor of this kind on record weighed fifteen ounces and measured 27.5 centimeters in its greatest circumference.

REFERENCES

1. Attenborough, A. G., and Pitts, A. T.: Complex Composite Odontome, Brit. Dent. J., pp. 45, 1389, 1394, October 15, 1929.
2. Hopewell-Smith, A.: Two Odontomes, Dental Surgeon, pp. 20, 557, 558, September 1, 1923.
3. Joseph, J. H.: Case of Geminated Composite Odontome, Brit. Dent. J., pp. 47, 62, 63, January 15, 1926.
4. Lewin Epstein, S.: Interesting Case, Dent. Mag., pp. 43, 305, 306, May, 1926.

5. Moorhead and Dewey: Pathology of the Mouth, Philadelphia, p. 483, 1925, W. B. Saunders Co.
6. Blair and Ivy: Surgery and Diseases of the Mouth and Jaws, St. Louis, ed. 3, p. 433, 1920, The C. V. Mosby Company.
7. Ewing: Neoplastic Diseases, Philadelphia, p. 718, 1922, W. B. Saunders Co.
8. Waldron, Carl: Tumors of the Mouth and Jaws, J. Minn. State Dent. Assn. **6**: 18, 1927.
9. Lyons, C. J.: Cysts and Tumors in the Oral Cavity, J. A. D. A., November, 1924.
10. Dewey, Kaethe W.: Osteoma of a Molar, Dental Cosmos **69**: 1143, 1927.
11. Schultz: Odontomas, J. A. D. A. **17**: 1874, 1930.
12. Hopewell-Smith, Arthur: Normal and Patho-Histology of the Mouth, Philadelphia, Vol. 2, p. 206, 1918, P. Blakiston's Son & Co.
13. Dunning, Henry S.: J. A. D. A. p. 318, April, 1924.
14. Stokes: Modern Clinical Syphilology, Philadelphia, ed. 1, p. 691, 1927, W. B. Saunders Co.

ABSTRACT OF
CURRENT LITERATURE

NUTRITION AND PEDIATRICS

By Samuel Adams Cohen, M.D., New York City

It is the purpose of this Journal to review so far as possible the most important literature as it appears in English and foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

The Effect of Irradiation With Ultraviolet Light on the Frequency of Attacks of Upper Respiratory Disease. (Common Colds.) J. A. Doull, M. Hardy, J. H. Clark, N. B. Herman. Am. J. Hygiene **13**: 2, 1931.

Because of the claims in regard to the effect of irradiation on the frequency of attacks of common colds the report of Doull et al. is rather timely.

These investigators of Johns Hopkins University quote the results of Maughan and Smiley who reported favorable results in reduction in the incidence of colds in adults by usage of the mercury vapor lamp. On the other hand, Barenburg and Lewis working with infants and using the carbon arc lamp, reported that the group of children irradiated had had more colds than the control group who were not exposed to this irradiation.

In addition the writers mention the fact that, as a result of a carefully controlled study, Colebrook also was unable to demonstrate any measurable effect on the health of school children in England who were exposed to carbon arc lamp with a high output of ultraviolet rays.

During the academic year 1929-1930 the authors observed the effects of ultraviolet irradiation on 363 adult volunteers who were either students or members of the faculty or the technical staff of either the Johns Hopkins School of Medicine or School of Hygiene.

After a period of 35 weeks' observation, the investigators noted that all told the 363 volunteers had 930 attacks of acute upper respiratory disease, exclusive of cases of follicular tonsillitis, peritonsillar abscess, acute specific fevers, and of illnesses of one day or less. From their carefully controlled study in which approximately one-half of the volunteers were selected at random for irradiation with mercury-vapor lamps for a duration which included the first 31 weeks of the period, the writers summarize their findings by stating that the total incidence of respiratory infection for the period was slightly higher for the adults who were irradiated (receiving ten or more treatments) than for the control individuals who were not given treatment with the mercury-vapor lamp. Moreover, there was no difference in the severity and also the duration of the respiratory infections as between the control group and the irradiated group.

The Distribution and Treatment of Late Rickets and Osteomalacia in Northern India. Dagmar C. Wilson. Indian Medical Gazette **66**: 2, 1931.

Rickets and osteomalacia are found in northern India and Kashmir in towns wherein there is insufficient sunlight combined with an unbalanced dietary, and in rural areas whenever plentiful sunlight cannot compensate for a diet quantitatively and qualitatively deficient.

The incidence of rickets among schoolgirls from ages of five to seventeen years was 607 out of a total of 1482 examined. Wilson observed that the disease may start at any age, but the sex incidence shows that in late rickets and osteomalacia the chief strain falls on girls and women during adolescence and maternity.

The writer further noted that dental caries was found to be more widespread among Indian children than previously supposed.

Osteomalacia, which is fairly common among the feminine sex in those sections of India where the diet or hygiene is unsatisfactory, occurs usually after the eighteenth year. An uneven gait, a pelvis which is widened and tilted, increased dimpling of the skin over sacroiliac articulations and subperiosteal tenderness constitute the early clinical picture of osteomalacia. Later the characteristic waddling gait and irregular contracted pelvis make their appearance.

The treatment, which is fairly successful, includes sunlight and foods such as milk and the daily use of fresh fruit or vegetables and vitamin D in form of cod liver oil or an irradiated substance.

Thanks to the agency of the Red Cross, information emphasizing sunlight and diet and their relation to the prevention of osteomalacia and rickets has been spread in Punjab.

The Child of Very Superior Intelligence as a Special Problem in Social Adjustment. Leta S. Hollingworth. Mental Hygiene **15**: 1, 1931.

Professor Hollingworth of Teachers' College, Columbia University, states that children of very superior intelligence are not as a group socially annoying. Moreover, he noted that contrary to the traditional belief these children are superior in other qualities, such as emotional stability and control, and, moreover, are superior to the so-called normal children or "controls" in their resistance to temptation.

The gifted child drifts into school, and because it is held to the lockstep which is determined by the capacities of the average, it naturally has little to do. The higher their intelligence the more bored these children are apt to be with the ordinary school routine.

On the other hand, if the child is greatly accelerated in grade status, it soon finds that it is out of place physically and emotionally. Further, if the gifted child is a boy, he is frequently toyed with by his older and larger classmates, and often is the victim of some dull adolescents who bully and tease him.

The author comments on the fact that the gifted know and are eager for games of intellectual skill such as bridge and chess, and are little interested

in games which include aimless activity, or in the case of a gifted girl, in dolls and tea sets. But in this respect the gifted children are checked by age and tradition, and at times find it difficult to hit upon a happy compromise between getting along with those who are their equal intellectually but superior physically and emotionally, and the children of their own age and stature but far below them mentally.

Very often these children solve their own problem by development of solitary play, collecting, reading, and the like.

The gifted girl is frequently misunderstood because she is more competitive, or aggressive and more active than girls of like age are supposed to be. And because of the thousand and one cues, the gifted girl realizes more and more as she approaches the age of adolescence that her problem is on the one hand either to adjust herself to a sense of sex inferiority without losing her self-respect and her self-determination, or on the other to become morbidly aggressive.

Although highly intelligent children are on the whole more easily disciplined than children generally are, nevertheless, certain problems do arise because it is hard for them to maintain silence when ideas press for utterance. In addition, there exists a stronger tendency to *argue* (italics author's) about what is required of them than is found with the average child.

Because gifted children catch on to the cause and effect very easily, they usually "excel" in tantrums, and subtle forms of behavior so as to be released from undesired responsibility. It is gratifying to note that Professor Hollingworth mentions the fact that neglect and ostracism are good forms of punishment for them.

The writer emphasizes the fact that many of the so-called problems are functions of immaturity, but as the child grows older the social and physical handicaps are not so apparent as in later childhood and adolescence. Moreover, the classmates become automatically more congenial through being more highly selected, so by the time the gifted person is physically mature, many of the problems are taken care of, because the individual is now able to achieve control of his or her own life. But, as already pointed out, it is during childhood that the gifted child is "at the mercy of guardians, whose duty it is to know his nature and his needs much more fully" than they do now.

Excessive Ultraviolet Irradiation. Alfred F. Hess and Philip E. Smith. Am. J. Dis. Child. **41**: 4, 1931.

Hess, who is one of the foremost authorities of ultraviolet irradiation, and Smith, his coworker, comment on the fact that although ultraviolet irradiation has been made use of for more than ten years, there has been no prolonged observation made as to the effects of this remarkable remedial agent on the growth and functions of the body. In order to observe what effect, if any, a prolonged period of irradiation had on rats, these investigators experimented with two series of animals (one of which was used as a control), and noted the effect on the rats which were exposed to three different intensities of irradiation. At the same time as an added value to the investigation, Hess

and Smith thought it wise to compare these results with the effect of irradiated ergosterol (viosterol) given in small as well as in excessive amounts.

After a trial period of five to six months the authors found that there was no difference in the growth of the experimental animals, even those subjected to intensive ultraviolet irradiation given in large doses of viosterol, and the control animals. Furthermore, at autopsy no difference was noted between the endocrine glands of the treated and those of the untreated animals.

Opinions of 470 Physicians in Regard to the Advantages and Disadvantages of Using Bran and Roughage. Walter C. Alvarez. Minnesota Med. **14**: 4, 1931.

In an interesting and highly instructive article Alvarez makes some pertinent remarks on the present-day phobia of vitamins, and, more particularly, on the harmful effects following the ingestion of bran and other forms of roughage.

Writing from The Mayo Clinic, Alvarez sent out questionnaires to physicians throughout the country asking for their opinion in regard to their clinical experience with bran.

Although Alvarez, who is an authority on gastroenterology and has made many contributions to that particular field, realizes the shortcomings of questionnaires in general, he nevertheless feels conversant enough with the subject and the 470 physicians who answered to formulate an opinion regarding the uses and abuses of vitamins and bran.

Among other remarks which Alvarez makes is that bran is highly indigestible and in a great many instances does harm. With rare exceptions this was the opinion of the physicians who answered the questionnaire. Moreover, a number of physicians noted that many persons who for a time tolerate the use of bran, later get into trouble and suffer with indigestion. There is the general feeling among the physicians that the intake of large quantities of roughage does more harm than good, particularly in those individuals who have weak, easily disturbed digestion, or a bowel in which there are narrowed and highly irritable places.

Alvarez states that it was the consensus of opinion among the physicians that much of the propaganda for the ingestion of bran and roughage "has been fostered by laymen who have something to sell, and by faddists and cranks who possess neither good judgment nor adequate information."

Although there are a number of physicians here and there who have become enthusiastic about avitaminosis, Alvarez feels strongly with many more physicians that at the present time vitamins are overdone and overemotionalized. Except for the poor and undernourished who, for instance, are more numerous in the South, and who necessarily have an inadequate amount of food, the author is of the opinion that elsewhere in this country adults who eat sensibly have enough vitamins stored in the body to tide them over for a few weeks or even months of semistarvation.

On Enuresis. Leopold Mandel. Brit. J. Child Dis. **28**: 325, 1931.

Mandel feels that enuresis is one of the most irritating and difficult problems of medicine, because an intimate knowledge of the patient's physical

condition and also his background is essential before satisfactory therapeutic measures can be instituted. The author holds that the family physician is best qualified to take care of this troublesome condition. Although sometimes enuresis is due to some definite pathologic condition. Mandel states that in the majority of cases enuresis is a nervous disorder and must be regarded and treated as such. According to him, enuresis may be a symptom of the hypersensitive neuropathic or nervous type of child, in which the instability is a symptom which may be regarded in the same light as other symptoms such as cyclic vomiting, ketonuria, vagotonia and the like. Mandel considers that with some children enuresis is more of a behavior complex, while in others it may be an evidence of an endocrine disharmony, particularly hyperthyroidism.

In all cases, however, Mandel believes that atropin or belladonna is the specific drug of choice. Moreover, in the general scheme of treatment of these cases close cooperation and patience are required of the physician, child, parents and teacher.

The Economic Importance of Squint in Children and Its Effect in After Years. Frank N. Knapp. Minnesota Med. **14**: 4, 1931.

Knapp rightfully points out that the early diagnosis and treatment of squint are equally as important as that of tuberculosis or cancer. Although parents, as a rule, seek aid for their children with squint primarily for cosmetic reasons, the author feels that this viewpoint should be secondary to the possible loss of vision of the affected eye which frequently occurs if treatment of the squint is unduly delayed.

All cases of squint should be examined for any possible refractive error. If the wearing of glasses is practical and no improvement follows within six months after their use, then it is the experience of Knapp that glasses alone will not relieve the squint. Various measures, such as covering or bandaging the good eye to compel use of the squinting eye, or paralyzing the accomodation of the good eye and thus theoretically compelling the patient to use the squinting eye, are advisable to improve the visual acuity in the deviating eye.

If after a satisfactory trial these measures and fusion training are unsuccessful, and if the sight of the squinting eye is to be saved, an early operation should be instituted. The most effective period for treatment is in the preschool age, because after the age of eight or ten years it is quite impossible to reeducate the fusion sense.

Knapp aptly points out that the loss of vision of one eye from squint is a serious handicap to the individual, particularly when seeking employment, and he makes the plea that no physician should be guilty of advising parents that the child will outgrow the defect.

The Prognosis of Acute Glomerular Nephritis in Childhood. Harriet G. Guild. Bull. Johns Hopkins Hosp. **48**: 4, 1931.

From a follow-up examination of patients seen at the Harriet Lane Home from 1912 to 1928 for acute hemorrhagic or glomerular nephritis in children. Dr. Guild is of the opinion that the prognosis is good as far as permanent kidney

involvement is concerned. Furthermore, there does not seem to be any impairment in the growth and development of children who were discharged from the hospital with this condition. The author also noted that the younger the child, the better the prognosis for complete recovery.

The writer's experience concurs with the opinion of many others who find that children who have once had acute nephritis stand subsequent infections without any greater liability to complicating kidney disease than those children who have never had nephritis.

Although there were many patients who had had acute hemorrhagic nephritis and now have practically normal kidney function in spite of their neglect to take care of focal infection, nevertheless, the author feels that cases which have had these foci of infection treated did better.

A Bacteriological Study of "Colds" on an Isolated Tropical Island (St. John, United States Virgin Islands, West Indies). Daniel F. Milam and Wilson G. Smillie. Jour. Exper. Med. **53**: 5, 1931.

St. John, United States Virgin Islands, West Indies, with a permanent population of about 700 negroes, seven or eight whites including four marines, has been selected for a bacteriologic study of "colds" by Milam and Smillie. Colds were less prevalent and milder there during the year of observation beginning from April, 1929, than during the same period in the United States or in Holland.

Although temperatures throughout the year only vary 12° to 15° F. between the morning and night, or for that matter between the winter and summer, nevertheless it was found that there is a correlation between the incidence of colds and season as is recorded by observers in the temperate zones.

In a careful bacteriologic study of the throats of normal negroes and those who had colds, these investigators were unable to determine any significant variation in the nasopharyngeal flora in persons with colds and those without colds. Moreover, it is interesting to know that although certain bacteriologic differences were noted in general, the same types of organisms were found in the nasopharynx of persons living in isolated communities in the tropics as have been seen in the nasopharynx of individuals living in the temperate zone and even in the arctic zone.

The studies of Milam and Smillie further emphasized the fact that the specific agent that initiates colds is infectious in nature, and is spread by direct contact with an incubation period of one to three days. The authors also are of the opinion that environmental factors, particularly reduction in atmospheric temperature, have some bearing upon the incidence of colds.

The International Journal of Orthodontia, Oral Surgery and Radiography

PUBLISHED THE FIFTEENTH OF EVERY MONTH BY

THE C. V. MOSBY CO., 3523-25 Pine Blvd., St. Louis, Mo.

Foreign Depots — *Great Britain* — Henry Kimpton, 263 High Holborn, London, W. C.; *Australasia*—Stirling & Co., 317 Collins Street, Modern Chambers, Melbourne; *India*—"Practical Medicine," Egerton Street, Delhi; *Porto Rico*—Pedro C. Timothee, Rafael Cordero 68, San Juan, P. R.

Subscription Rates—Single copies, 75 cents. To anywhere in United States, Cuba, Porto Rico, Canal Zone, Mexico, Hawaii and Philippine Islands, $7.00 per year in advance. Under foreign postage, $7.40. Volume begins with January and ends with December of each year.

Remittances—Remittances for subscriptions should be made by check, draft, postoffice or express money order, or registered letter payable to the publishers, The C. V. Mosby Company.

Contributions—The editor will be pleased to consider the publication of original communications of merit on orthodontic and allied subjects, which must be contributed solely to this Journal.

Opinions—Neither the editor nor the publisher hold themselves responsible for the opinions of contributors, nor are they responsible for other than editorial statements.

Reprints—The publishers will communicate with authors regarding reprints upon publication of paper.

Communications—Contributed articles, illustrations, letter, books for review, and all other matter pertaining to the editorial department should be addressed to the Editor, Doctor Martin Dewey, 17 Park Ave., New York City. All communications in regard to advertising, subscriptions, change of address, etc., should be addressed to the publishers, The C. V. Mosby Company, 3523-25 Pine Blvd., St. Louis, Mo.

Illustrations—Such half-tones and zinc etchings as in the judgment of the editor are necessary to illustrate articles will be furnished when photographs or drawings are supplied by the authors of said articles.

Advertisements — Objectionable advertisements will not be accepted for publication in this Journal. Forms close first of month preceding date of issue. Advertising rates and sizes on application.

Change of Address—The publishers should be advised of change of subscriber's address about fifteen days before date of issue with both new and old addresses given.

Nonreceipt of Copies—Complaints for nonreceipts of copies or requests for extra numbers must be received on or before the fifteenth of the month of publication; otherwise the supply is apt to be exhausted.

Entered at the Post Office at St. Louis, Mo., as Second-Class Matter.

EDITORIALS

Dr. J. Lowe Young

ALL of Dr. Young's friends were shocked and grieved to hear of his sudden death. This came as a surprise because Dr. Young had recently passed through a serious operation to relieve the pain which he suffered from a hip joint involvement. This condition had become so serious that the pain was excruciating, and everyone familiar with the condition realized that it required a considerable amount of determination and "nerve" for a man of his age to undergo such a serious operation.

His friends were pleased to learn the operation had been successful in relieving the pain, and he was making a satisfactory recovery.

He died at his home, 18 West Seventy-fourth Street, New York, N. Y., on May 3 of heart disease. He was sixty-four years of age and had made his home in New York City since 1905.

He came to New York shortly after taking the course at the Angle School of Orthodontia. Dr. Young was born in Ontario, Canada, and received his early education in Canadian schools. He studied dentistry at Toronto Dental College. Later, he entered Philadelphia Dental College. He received his degree in 1890. He then moved to Montana and began the practice of dentistry. Three years later he went to Detroit where he continued the practice of dentistry until he took up the study of orthodontia at the Angle School in St. Louis. Dr. Young was made Professor of Orthodontia when the Dental Department of Columbia University was organized. He later resigned this position.

Dr. Young was president of the Orthodontic Section of the Panama Pacific Dental Congress and later served as president of the American Society of Orthodontists.

When a group of younger orthodontia practitioners in New York City organized the New York Society of Orthodontists, they were very eager to have Dr. Young become the first president, which he did. They believed Dr. Young with his strong personality would do more toward making the New York Society of Orthodontists a success than any other man in New York City. He also served as president of the First District Dental Society.

Dr. Young's knowledge of the occlusion of teeth caused him to become interested in better restorations. Consequently, in his early days he wrote several papers calling the attention of the profession to the importance of restoring normal tooth form and construction of fillings and inlays. He also collaborated with Dr. Angle at the time the pin and tube appliance was introduced in the production of the Young-Angle lock. This lock was patented, as were many other orthodontic devices brought out by Dr. Young; however, very few of them ever appeared on the market.

Dr. Young is survived by his wife, Hester Bateman Young, two sons, three daughters and a grandson.

The orthodontic profession has lost one of its stanchest supporters, and his death is a great loss to the dental profession.

Cooperation Between the Dentist and the Orthodontist

"Dear Dr. Mosby:

"Having been enlightened in my state of nearly utter darkness by your explanation in the March issue entitled 'Why the Public Knows So Little About Orthodontics' I shall assume the ignominious task of answering certain of your statements. It is possible that a certain percentage of our profession looks upon the orthodontist as upon an octopus, but did it ever occur to you just why? Believe me it is not all based upon complete ignorance. I shall cite just one case: a patient recently referred to me for dental care had received orthodontic service in a near-by city. Because of the extensive time, expensive

materials, and extremely delicate technique she was charged something over $750. Her brother is at present receiving similar attention. An x-ray examination revealed four proximal cavities and several pit and fissure cavities. The total charge for dental service for these teeth would not have exceeded $100, but because her father had already spent so much money for orthodontic treatment, the young lady will have to wait until she can earn the money by teaching school. Of course things have changed somewhat financially with her family, but is it possible that in securing an adequate fee for his services the orthodontist did not elevate himself so much above his more humble brothers that a decent fee could not be received for plain dental work. This may be entierly unfair but let a few of these cases hit Mr. General Practitioner on his checking account and see how far he will go in advocating orthodontic service for his patients.

"I am wondering if it would not be a helpful thing for the orthodontist to consider the meaning of cooperation from another angle, and when these patients leave his office with their expensive mouths they would not hunt up cheap dental restorations in order to save a few dollars from what they, no doubt, consider a big loss. Cases similar to the one cited above are common experiences for small town dentists, and being more or less human and perhaps a little too irritable, these dentists dislike charges of ignorance because of their attitude toward orthodontia.

"It has always been my practice in the past to recommend orthodontic interference where abnormalities were noted, and I have always advocated that the patient be treated by an orthodontist, but can I be expected long to do so when the postorthodontic patient kicks at a five-dollar prophylaxis?

"Mercenarily yours,"

(Signed) C. R. Hocker,
Ponca City, Okla.

The above letter is published for the purpose of showing orthodontists who read this Journal what the dentists think—or at least what one dentist thinks—about cooperation between dentists and orthodontists.

The age-long conflict between self-interest and idealism in professional conduct is brought to the fore in this letter. When the dollar mark is uppermost, idealism is very likely to be compelled to take a back seat. Commercialism is rampant in professions today. There are doctors splitting fees with surgeons; the best interest of the patient is forgotten while the operation to be done is put upon the auction block and goes to the surgeon willing to pay the largest commission to the doctor sending him the case. There are lawyers consorting with racketeers, bootleggers, kidnappers, and murderers. Upon the payment of a fee these moral lepers are shown a way to circumvent the law and escape punishment for their misdeeds. There are clergymen selling their influence to politicians, and for this mess of pottage are thrown political plums of one kind or another.

Dentistry can easily fall into the same quagmire that is besmirching the doctor, the lawyer, and the clergyman. Specialization in dentistry is growing; we now have the prosthodontist, the exodontist, the orthodontist, the

pediodontist, the radiodontist, and the oral surgeon. What a mess these specialties will soon find themselves in if the dentists and the specialists look first to the income they receive from their patients and not first to the patients' welfare.

The practice of medicine and of her sister profession, dentistry, is a serious undertaking. It calls for a heart as well as a head, for character as well as skill in making a diagnosis or applying treatment. If the doctor or the dentist cannot see beyond the financial gain that comes from serving a patient and cannot visualize the best interest of the patient and advise accordingly, then medicine and dentistry have sunk to a low plane.

The patient and the patient's best interest must be the chief concern of the real doctor and the real dentist. There is much to be gained on both sides by a full discussion of cooperation between the dentist and the orthodontist. The editorial column of this Journal is open to anyone who cares to express his views on the subject provided no personalities are indulged in.

—*C. V. M.*

TO SUPERVISORS OF PERMITS AND OTHERS CONCERNED

Section 1731, Regulations 2, Revised April 1, 1931, provides as follows:

"Sec. 1731. Liquor administered by dentists.—Intoxicating liquor may be administered by a dentist to his patients while under his immediate care cases in which the use of such liquor is necessary to afford relief. A dentist may under proper permit obtain not more than 6 quarts of liquor during any calendar year for administering to patients. Liquor administered by dentists as herein provided may not be furnished to any person other than the patient, and may not be furnished to the patient under conditions constituting a sale."

Dentists holding permits to use alcohol, who intend to administer liquor to patients under the above quoted Section in the present calendar year, will be required to make application for amendment of their basic permits. Permits to purchase may not be issued until the liquor applied for is covered by the amended basic permit.

Permits to purchase will be issued for the quantity authorized under Section 1731 for a calendar year. The quantity so obtained will be in fact for a full calendar year. If the permit to purchase is issued on May 1, 1931, no further purchase may be made until May 1, 1932.

(Signed) J. M. Doran, *Commissioner.*

IN MEMORIAM

DR. THOMAS PHILIP HINMAN

On Thursday, March 19, 1931, Dr. Thomas Philip Hinman of Atlanta, Ga., died.

Although Dr. Hinman was not in the best of health since last May, it was nevertheless a shock to his friends when they heard of his death.

While Dr. Hinman was well known in the dental profession, it must also be remembered that by his passing, orthodontia lost one of its best supporters. He was Professor of Orthodontia at the Southern Dental College for a number of years until he was succeeded by Dr. Clinton Howard of Atlanta. He was a past president of the American Dental Association. He was Professor of Oral Surgery at the Southern Dental College, and Dean of the faculty, at the time of his death.

Dr. Hinman was born in Sebringville, Ontario, on March 4, 1870. He received his degree from the Southern Medical College in 1891, and was awarded the honorary degree of Sc.D. by the University of Georgia in 1924. Dr. Hinman contributed much to the advancement of dentistry. He was the second man, south of the Mason-Dixon line, to take up the use of the x-ray as an adjunct to dentistry. Dr. Kells of New Orleans being the only one who preceded him. Dr. Kells's death, as many of his friends know, was caused by the early use of x-ray before methods of protection had been perfected as they are today. Dr. Hinman also sustained x-ray burns on his hands which caused him trouble until the time of his death.

Dr. Hinman was much loved and respected by his friends. He was one of the few men in whose word implicit confidence could be placed. If he was your friend, he showed it until the very end. If he was opposed to your principles or policies, you were also made aware of that fact. He was a very fluent orator, possessed a great amount of wit and humor, and was constantly in demand as toastmaster at banquets.

Dr. Hinman was always active in the American Dental Association, and served on the Board of Trustees for a number of years.

He will be missed by his many friends.

DR. SILAS E. DODSON

Silas E. Dodson died in New York City on February 14, 1931. It was known for some time that Dr. Dodson suffered from a heart condition, which was the cause of his death.

He was born in Latrobe, Pa., March 1, 1863. He began the study of dentistry as an office boy in the office of Dr. Welsh. In 1885, Dr. Welsh

moved to Grand Rapids, and Dr. Dodson accompanied him. Shortly after that time, he entered the office of Dr. Robinson, one of the oldest dentists in western Michigan. In 1890, Dr. Dodson passed the state examination in Michigan and received his certificate and began the practice of dentistry.

In 1903, Dr. Dodson took a course with Dr. Angle at the Angle School of Orthodontia in St. Louis. After that time, he began to pay more attention to the practice of orthodontia, later he disposed of his general practice and devoted his time entirely to orthodontia. He was the first man to take up the practice of orthodontia in Grand Rapids, Mich., at which time he was the only orthodontist in Michigan outside of Detroit.

Dr. Dodson was a very likable person. He made many friends in the various walks of life.

Dr. Dodson was buried at Grand Rapids on February 16.

TRIBUTE READ AT TOM DODSON'S FUNERAL

FEBRUARY 16, 1931

BY MYRTLE KOON CHERRYMAN

"Death, the word which we all avoid yet which is surely one of the most beautiful words in our language. It is death that the falling leaves seek in the autumn, that the fading year seeks, that we all seek together. It is the most profoundly natural thing we do. We are partial creatures, temporarily blinded to all but fleeting glimpses of reality; of course, we hope for the clear vision which we believe the dissolution of our teasing sense will give. Heirs of infinity, we inevitably wish we might come of age. We would not hasten the coming, for the process itself is good; but every step that lessens the distance deepens our content."—Zephine Humphrey.

From the drama, "Death Takes a Holiday," I wish also to read: "Has it ever occurred to you that death may be simpler than life, and infinitely more kind?"

Life is not simple for any of us, is it? It might be for some of us, we think, if there were only ourselves to consider, but we cannot live on Crusoe Islands, for that would not be life. It is these complications with other human beings that make the human drama, for there is no drama, you know, without a conflict.

In youth, we often think life is simple, when something we have desired comes to us—a fulfilled ambition to shine, a congenial occupation, some economic lift, a great love; we say at these times, "Now it is all plain sailing!" But there are rocks and shoals for the best of us, and I sometimes think that those who prove to be good mariners for even a part of the way are to be congratulated. And this has come to me increasingly of late, that those whose ships weather the gales and avoid the rocks better than those of other navigators are simply more fortunate than others. They may be saved by some greater care by the shipbuilders, or some happy chance in piloting. But not to continue an image until it becomes too involved, I want

to speak quite simply of my friend, Tom Dodson. After I heard of his death, my mind went back, as our minds always do at such times, to the early days of my acquaintance with him, those days when we were all young together, and there came back to me the admiration I felt then for the struggle against odds, toward a place in the sun, a professional standing, and fine human relations. That admiration extended itself to his genuine achievement, his gift of making friends, his generosity, joviality, and appreciation of literature. This last brings me so many pleasant memories. Over the telephone, on the street, in a chance encounter anywhere there would be a greeting: "Myrtle, have you read so and so?" Not a wide range of books, perhaps, but there was this to be noted, that he always commented on things which had some real value, and that he always had an opinion of his own about it, uninfluenced by what he thought he *ought* to think. There was refreshing individuality about his book comments even when one challenged his opinions.

I have been haunted all this morning by a phrase which I have finally located as coming from one of our American poets, "Gleams of God's omnipotence." I have seen these gleams all the way, in this struggling soul, and as I look back now through the clouds and mists, those gleams come clearer, until the clouds disappear. There is a hand held out in honest congratulation, a humorous yet hearty greeting that makes one go on the happier for it, stimulating comment on a book, an offer of generous service faithfully rendered, glimpses of the inner struggle, an inarticulate yet eloquent look of sympathy in time of sorrow.

How all these shine today, and how I wish, my friends, that we could all keep the memory of such gleams, not only of this old friend but of all those whom our lives touch. It would make things easier for us, wouldn't it? I find even this glorious sunshine with which we are blessed of late, obscured at times, with vexations over this or that person who has disappointed me. If at these times I could remember the kindnesses and stimulating contacts these same persons have afforded, without the "Yes, but—" which spoils it all, how much happier—yes, and better—I would be! It is not hard to do this today about dear old Tom, and as we go forth from this house, I ask you to remember with me his courage in a time of great strain, his generosity and humor, his pleasant ways with children, and all those gleams of God's omnipotence which help to pierce the shadows of this our life and give it meaning.

"IN MEMORIAM" RESOLUTIONS

J. Lowe Young

In the death of Dr. J. Lowe Young, the Eastern Association of Graduates of the Angle School of Orthodontia has lost one of its most beloved and useful members.

Dr. Young was born in Eckford, Middlesex County, Ontario, Canada, February 10, 1868. After attending the Toronto Dental College he went to the Philadelphia Dental College where he was graduated in 1890. After practicing dentistry in Montana for three years he went to Detroit where he continued the practice of dentistry until he took the Angle Course in St. Louis in 1903 and became one of the teaching staff. He had previously been a member of the faculty of the Detroit Dental College. In 1905 he came to New York and devoted his time exclusively to orthodontia. When the School of Dental and Oral Surgery was organized, he was appointed Professor of Orthodontia, but his health forbade his continuing in that post.

He served as president of the American Society of Orthodontists, the New York Society of Orthodontists and the Eastern Association of Graduates of the Angle School of Orthodontia as well as of the First District Dental Society of New York. He was a Fellow of the American College of Dentists and the New York Academy of Dentistry and a member of Delta Sigma Delta Fraternity.

Dr. Young was a man of positive convictions, yet one who welcomed information and valued every contribution to the science of orthodontia. His frankness and sincerity made him highly esteemed.

He contributed generously to his specialty by literary contributions, clinical demonstrations and many useful inventions. His advice was often sought and generously given, and in a fashion which characterized him as a born teacher.

It was by this pioneer spirit, which Dr. Young exemplified, that a lasting foundation for orthodontia has become so firmly established, therefore, be it

Resolved, That this Society express its sorrow in our great loss and that a copy of these resolutions be sent to his family and to the journals.

HENRY C. FERRIS
FREDERICK T. MURLLESS, JR.
ALBERT W. CROSBY
—Committee.

Dr. William C. Fisher
501 Fifth Avenue
New York, N. Y.

Dear Dr. Fisher,

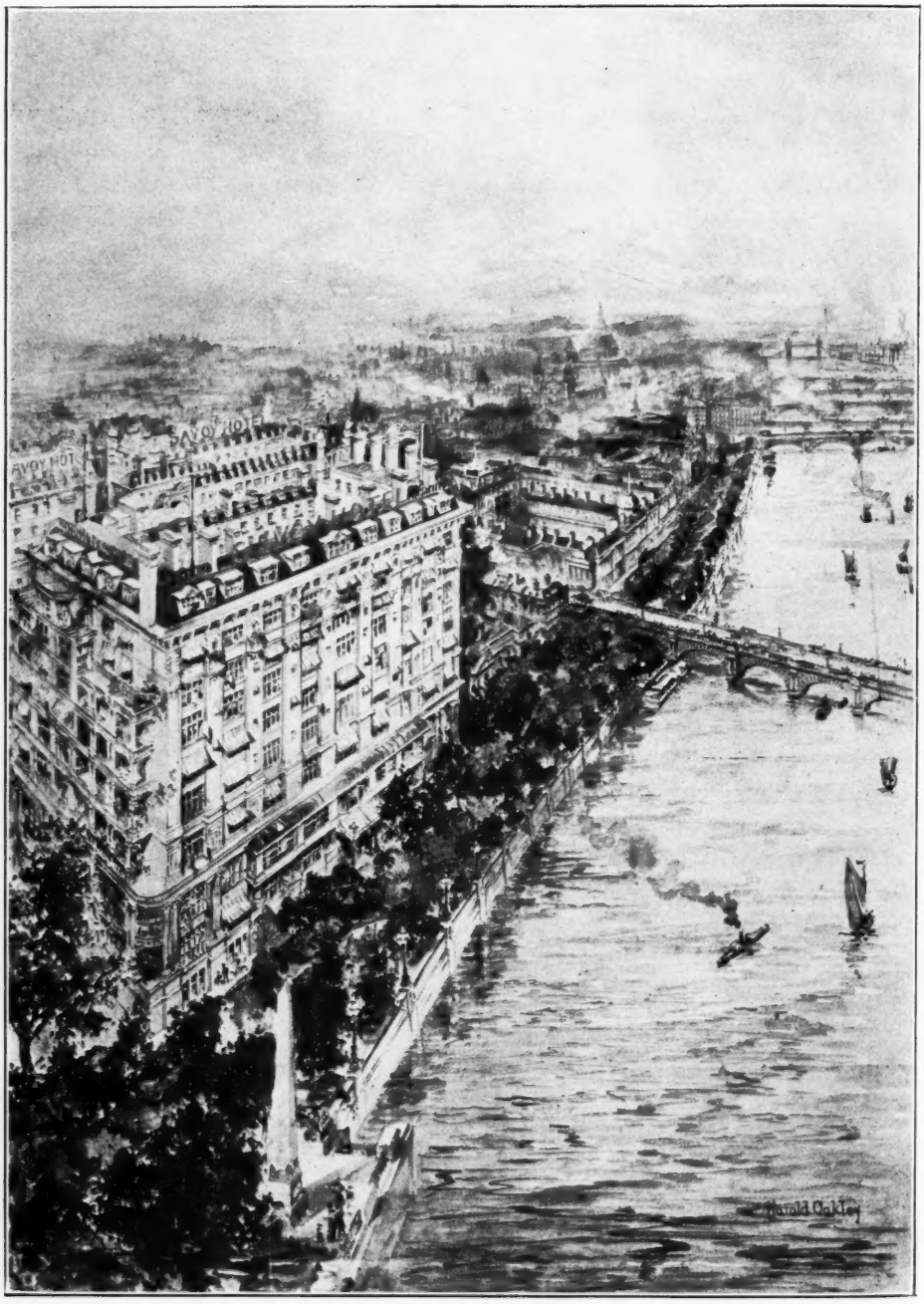
It is with the deepest regret that the President and Council of the Second International Orthodontic Congress have learned of the sudden death of

Dr. J. Lowe Young, and they wish me to ask you to express their very deep sympathy to the relatives.

No one can fail to be aware of the great work which he has accomplished for orthodontics during his life and his interest in that specialty, and his loss will be very widely felt.

Yours sincerely,

B. MAXWELL STEPHENS
Secretary-General.



SAVOY HOTEL, LONDON, ENGLAND

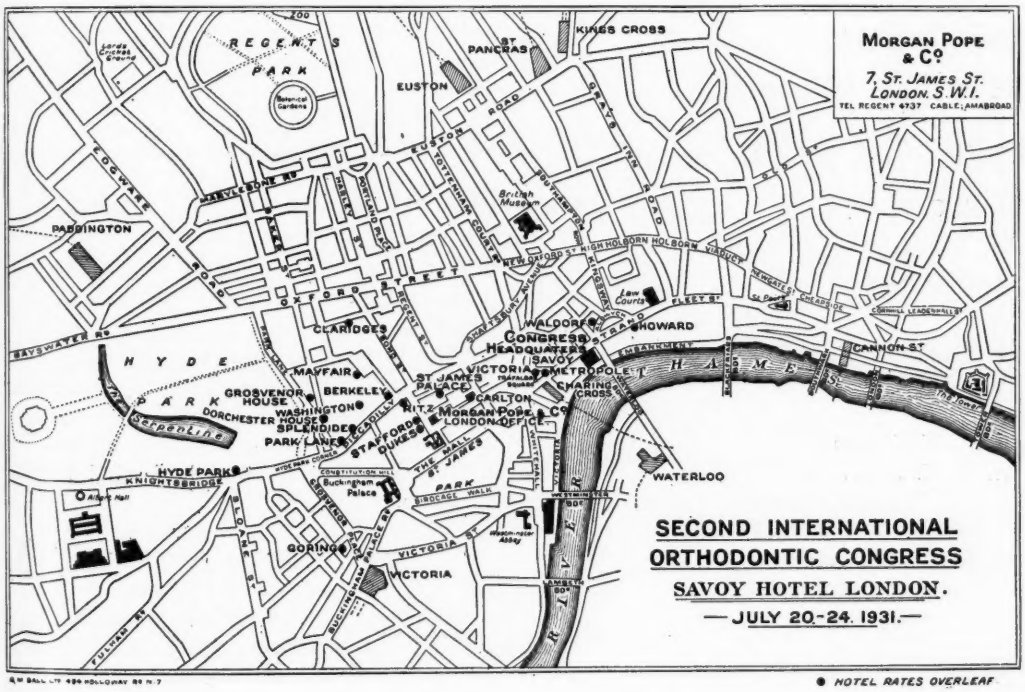
Headquarters of the Second International Orthodontic Congress

NEWS AND NOTES

Second International Orthodontic Congress

Savoy Hotel, London, W. C. 2

The Second International Orthodontic Congress will be held in London July 20 to 24, 1931. The headquarters will be the Savoy Hotel (and not the Hotel Great Central as previously announced).



Papers

Mr. Harold Chapman	Orthodontics—extraction as part of treatment.
Mr. G. C. Campion	Facial measurements in diagnosis.
Dr. L.de Coster	A new method of lesional analysis of dento-facial malformations.
Dr. S. Dreyfus	Considerations on the use of rubber ligatures in orthodontics.
Dr. Corrado d'Alise	The prophylaxis of malocclusion.
Dr. Edel	The improved lingual lock.
Dr. W. H. Gilpatric	The importance of stabilizing the corrected denture with an appliance before and during eruption of third molars.

Dr. George W. Grieve	Some points in the diagnosis of malocclusion.
Dr. E. M. Griffin	The technique of the resilient arch assemblage.
Dr. Milo Hellman	Some aspects of development of the face and its bearing upon occlusion of the teeth.
Dr. H. F. Humphreys	The development of the temporomandibular joint and its importance in orthodontics.
Dr. Meyer Hoffman	Contribution unspecified.
Dr. Herbst	Demonstration of the hinges of occlusion and a new kind of lingual arch.
Dr. A. F. Jackson	Some of the variations in the factors in malocclusion and their relation to treatment.
Dr. R. Kazanjian	The surgical treatment of mandibular prognathism.
Dr. Kurland	Contribution unspecified.
Dr. Samuel J. Lewis	Further observations of the growth changes of the teeth and dental arches.
Dr. Nord	Orthodontia, an essential part of dental education.
Dr. F. Neumann	Macroglossia as cause of dental anomalies.
Dr. Oren A. Oliver (Presented by Dr. Claude Wood)	Technique of the lingual and labial arches.
Dr. H. Y. Rihan	Dental and orthodontic observations on 289 adult and 53 immature skulls from Pecos, New Mexico.
Dr. A. Martin Schwartz	Tissue changes during orthodontic teeth movement affected with auxiliary springs.
Professor Dr. Paul Simon	The practical value of the biometrical norm in orthodontia.
Dr. H. G. Tanzey	The treatment of malocclusion cases, children and adults, complicated by the absence of permanent teeth, whether congenitally missing, the loss occasioned by accident, extraction, or conditions otherwise unavoidable.
Dr. Claude R. Wood	Band construction and the technique of the lingual and labial arches including auxiliary springs and their various types and uses.
Dr. C. Wachsman	Contribution unspecified.
Dr. T. V. Anderson	Biomechanical orthodontia for school clinics and common practice.
	Biomechanical orthodontic apparatuses.
Dr. L.de la Carrera	The actual trend of orthodontia; its esthetic and health aspects. The urgent need of orthodontia treatment for school children. Lack of cooperation between physicians and orthodontists.
Dr. Rudolph Schwarz	Individual measurements of face and jaw before and during orthodontic treatment.
Dr. Leuman Waugh	Dentition of Eskimos of North America. A contribution to the etiology of malocclusion.

Demonstrations

Dr. Robert H. W. Strang	Exhibit prepared by the Edward Angle Society of Orthodontia, consisting of models, photographs, x-rays, etc., of cases in Class II, Division 1, Angle classification treated with the edgewise arch mechanism.
Dr. Sydney W. Bradley	Some instruments I have found useful in orthodontic practice.
Messrs. George and D. H. Campion	Facial measurements in diagnosis.

Dr. William Gilpatric	(1) A new molar anchorage; a new orthodontic appliance with stabilizing bar (precious metal). (2) A method of registering the control of force used in tooth movement. (3) A modified (Jackson) removable retainer (precious metal).
Dr. A. M. Schwartz (Vienna)	A series of models on the results of the early handling of Classes II and III according to the author's method. Small helps in orthodontic study.
Dr. R. Schwarz (Switzerland)	Apparatus for cephalometric diagnosis.
Dr. Sheldon Friel	(1) a. Instrument for ascertaining the angle that the plane running from the incisal edge of the upper central incisors to the occlusal surface of the first molars makes with the Frankfort Horizontal Plane. b. Instrument for transferring this angle to the plaster models. (2) Frankfort plane prosopometer. (3) Gonial prosopometer.
Mr. Thomas Goodhugh	The causes of inaccuracies in models and their prevention in "impression taking."
Dr. Hugh Tanzey	Exhibiting plaster casts of cases complicated by the absence of teeth, appliances employed in the treatment, x-rays, photographs and other interesting data.
Dr. Sylvain Dreyfus	Film "Infant Feeding."
Dr. Charles A. Spahn	(1) Giant models, photographs and appliances. (2) Traveling orthodontic instrument unit.
Dr. Andrew F. Jackson	Some combinations of lingual and labial arches with auxiliary springs in orthodontic treatment.
Dr. L. Dufourmental	Film showing operation for prognathismus.
Dr. A. H. Suggett	The correction of a case of mandibular retraction, with pictures, x-rays, and appliances.
Dr. L. de Coster	The removable and fixed extra light appliances in orthodontia and the treatment of fractures of the maxillary jawbone. Demonstration of construction and electric soldering.
Dr. Ashley E. Howes	The expansion of deciduous arches.
Dr. Lowrie Porter	A cleanly efficient bite plane. (a) Indications for use. (b) Constructions. (c) Variations. (d) Treated cases.
Dr. Harvey G. Bean	Onlays for molar attachments.
Dr. George Grieve	Unspecified.
Dr. Claude Wood	Construction of lingual and labial arches, showing auxiliary spring attachments.

Demonstrations or exhibits have also been promised by:—

Dr. Glenn Young	The pin and tube appliances.
Dr. D. McCoy	Open tube appliances.
Dr. S. Riesner	A mouth tunnel for intraoral stereoscopy.
Dr. J. W. Ford	High labial arches.
Dr. G. V. Fisk	Pin and tube arch.
Dr. W. H. Ellis	A new lingual arch simplifying technique.
Dr. E. N. Bach	Various types of lingual locks.

The Editor, The International Journal of Orthodontia,
Oral Surgery and Radiography.

Dear Sir:

As already announced, the headquarters of the Congress will be the Savoy Hotel, London, and all papers and demonstrations will be given in that building.

Occurring as it does only once in five years, may we emphasize the very great opportunity of this meeting to all practitioners interested in orthodontics? Besides the important papers to be read by specialists of all countries, a large number of practical demonstrations will be given.

As at the last Congress held in Philadelphia in 1926, a museum has been organized. Contributions to this have been received from Europe, North and South America and the British Dominions, and are being catalogued and arranged.

As may be seen from the accompanying program, the social side of the Congress is not being neglected, and ladies accompanying members may be sure of a very happy visit to the metropolis.

All medical and dental practitioners are eligible for subscribing membership of the Congress, for which the subscription is £2.2.0. to be paid to the Treasurer-General, (Dr. E. Barrows, 71, Harley Street, London, W.1.) or to the Secretary-General (Mr. B. Maxwell Stephens, 76, Grosvenor Street, London, W.1.), who would supply any further information if requested.

Yours truly,

B. MAXWELL STEPHENS.

Third International Congress of Radiology

The following questions will be discussed at the third International Congress of Radiology which will be held in Paris July 26 to 31, 1931:

(1) Radiologic Examination of the Mucosa of the Digestive Tube.

(2) Radiologic Examination of the Urinary Apparatus by Excretion of Opaque Substances.

(3) Preoperative and Postoperative Treatment of Cancer of the Breast by Radiation (Recurrency and Metastases Excepted).

(4) Radiotherapy of Inflammatory Diseases.

(5) Diathermic Electrotherapy of Inflammatory Diseases.

At a general meeting, all sections being present, a thirty minutes' lecture will be given on each of these subjects. All congress members are invited to give the results of their experience on these questions both by special communication and during general discussion.

TRAVELS IN FRANCE

Congress members will benefit by a reduction of 50 per cent on the fare to and from the Congress on the French railways.

After the Congress several tours at reduced prices will be organized to different parts of France, including visits to various thermal and mineral watering places.

Particulars on the above-mentioned reduced rates on railway fares and on the tours after the Congress will be forwarded from the offices of the Congress to members who have paid their dues.

All information concerning hotel prices for the stay in Paris will also be forwarded.

The subscription fee is 300 French francs for members and 50 French francs for persons belonging to the member's family.

The summaries of the communications, not more than four hundred typewritten words, in English, French, or German, must be sent in before April 1, 1931.

All correspondence is to be addressed to the Offices of the Third International Congress of Radiology, 122 Rue La Boëtie, Paris 8ème, France.

R. LEDOUX-LEBARD, Secretary.

Visit the Eighth International Dental Congress in Paris, August, 1931

HYGIENE COMMISSION OF THE INTERNATIONAL DENTAL FEDERATION

This is an explanation of the aim and method of operation of the Hygiene Commission of the International Dental Federation (H.C., F.D.I.), for the dental profession.

The Hygiene Commission particularly covers the field of study of:

1. Mouth hygiene conditions in the various countries.
2. The influence of mouth and dental diseases on health conditions at large.
3. The means of improving mouth hygiene conditions.
   (a) By introduction and news of dental care, before, during, and after compulsory school age, for the purpose of improving mouth conditions.
   (b) By promoting dental care and mouth hygiene among the mass of the people (adults), that due to their social economic position are deprived of this benefit.
   (c) By inquiring how professional diseases of the teeth and mouth can be prevented.

The Hygiene Commission therefore approaches the national committees affiliated with the International Dental Federation for the purpose of collecting and getting acquainted with the most recent results of oral hygiene provisions and dental care as well as with the precautions in as many countries as possible.

The Hygiene Commission makes inquiries in many countries and is thus able, from the reports received, to spread information about oral hygiene and dental care. This information bears not only on installation, but also on the most economic application of the dental provisions for school children and adults (e.g., estimates of cost).

Furthermore, mention is made of the fact that during the annual session at Utrecht it was resolved that the Hygiene Commission should collect and widely disseminate means of enlightening the various nations about oral hygiene and dental care, so as to bring about appreciation of effective dental care as a necessity by the advancement and organization of annual exhibits.

In this way the Hygiene Commission promotes oral hygiene in all countries, organizes oral hygiene exhibitions on as many occasions as possible during the annual sessions of the International Dental Federation in the countries in which they are being held, for the instruction of the people, and in addition it tries to have these exhibits held in the countries affiliated with the International Dental Federation. The Hygiene Commission is endeavoring to make a permanent collection which is as complete as possible.

The Hygiene Commission considers it a duty to inquire scientifically and sociologically into the causes of diseases and the means for prevention or combating them.

There are the following three subcommissions:

1. The subcommission for dental care of children.
   (a) Infants.
   (b) School children.
   (c) Children past school age.
2. The subcommission for public dental care (adults).
3. The subcommission for oral hygiene investigations and International Mouth Hygiene institute.

These subcommissions are engaged in present-day problems of oral hygiene. The International Institute of Mouth Hygiene is affiliated with the Hygiene Commission.

The efforts of the Hygiene Commission of the International Dental Federation have already been successful. Under Professor Jessen's leadership the Hygiene Commission has been arousing interest in dental care in many countries.

The Hygiene Commission of the International Dental Federation has since 1925 entered into relations with the Hygiene Committee of the League of Nations through the intermediary of the Honorary President, Dr. N. M. Josephus Jitta, delegate of the Hygiene Committee of the League of Nations. This relation has been continued by a delegation from the Red Cross Commission. The Hygiene Committee of the League of Nations during the session of March 5-8, 1930, adopted the following resolution:

"The Health Committee, realizing the importance of maintaining efforts against dental diseases as vigorously as against other diseases, expresses its desire to be kept informed of the work of the International Dental Federation."

The Executive Council during the International Dental Federation's session at Brussels in 1930 charged the presidents of the Commission for External Relations (late Red Cross Commission) and of the Hygiene Commission of the International Dental Federation together to keep up those relations in the future.

We are confident that in this way governments of countries affiliated with the League of Nations will consider the aims of the Hygiene Commission of the International Dental Federation more than they have up to the present time.

VISCOUNT DE CASA AGUILAR, Chairman,
Madrid, Spain.

GEO. VILLAIN, Secretary,
Paris, France.

A.L.C.J. VON HASSELT, Treasurer,
The Hague, Netherlands.

American Society of Oral Surgeons and Exodontists

The thirteenth annual meeting of the American Society of Oral Surgeons and Exodontists will be held in Memphis, Tenn., October 16 and 17, 1931. The Elks Hotel will be the headquarters for the meeting.

HOWARD C. MILLER, Secretary,
55 E. Washington Street,
Chicago, Ill.

American Dental Assistants Association

The seventh annual meeting of the American Dental Assistants Association will be held in Memphis, Tenn., October 19 to 22, 1931.

RUTH F. ROGERS, President,
223 W. Jackson Blvd.,
Chicago, Ill.